

An Inquiry into Mental Variation

by

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Abstract

Although there are both common and specialised senses of the term "variation," (the OED lists dozens) there seems to be no well defined use of this term in philosophy.

The main task of my thesis is to demonstrate that variation can be defined as a cognitive technique. I suggest that variation has been frequently used by philosophers, although not always in an overt manner. Moreover, I attempt to show that it is reasonable to talk about the relative importance of variation by examining the role of variation in Locke's *Essay*, Husserl's and Reinach's phenomenology, cognitive science, and thought experiments.

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Dedication

To Silva and Katarina

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Introduction

This thesis will largely examine the single explicit account of variation available in philosophical literature: free variation in phenomenology. I will discuss the notion of free variation, introduced into philosophical discussion by Edmund Husserl, its roots, history and development, and what appears to be its tacit application in domains of philosophy other than phenomenology. However,

I will not only discuss the origins of this notion but also critically examine and appraise its nature and the extent of its application.

Whether this extent is narrow or broad will largely depend on how free variation is defined. It might be narrowly defined as a specific phenomenological procedure, dependant on numerous other phenomenological procedures and techniques, employed in order to "search for essences." Taken in this sense, the notion of free variation would remain faithful to its origins but it would also lose, I believe, much of its broader potential relevance and applicability.

Free variation may also be more widely defined in an attempt to demonstrate that recourse to the freedom of varying ideas, thoughts, or images is essential for constituting many judgments, actions and complex ideas. This activity would then be seen as essential, not only in finding out what things, concepts, and events *might* turn out to be, but also to find out with greater insight and precision, what they *are*. In other words, defining free variation widely would imply that several traditions and styles of philosophy, other than phenomenology, have tacitly depended on this procedure. It would also imply that free variation is not just a minute and obscure technique of a specialized philosopher but a frequently used and easily employed cognitive tool. My thesis, I hope, will be one step in that direction.

Put more generally, there are two fundamental properties of variation. These two basic properties of this cognitive operation, inherent in the very

notion of this cognitive activity, are its *freedom* and its *closure*. On the one hand, variation implies an apparently unrestricted freedom of the human mind to present some particular part or aspect of one's objects of knowledge as capable of being something else, or capable of being replaced by something else. To illustrate this, it is sufficient to consider ordinary expressions like: "This house would look way better with a red roof" or "This blouse should have blue instead of green buttons." On the other hand, variation by its nature implies rigid constraints imposed on the procedures, structures, and manners of varying. Hume, in his *Enquiry*, said something closely related to this twofold nature of variation. He suggested that nothing, at the first blush, may seem more unbounded and more free than human thought, which seems unrestricted by the limits of nature and reality. Yet at the same time one has to realise that our thought is,

....really confined within very narrow limits, and that all this creative power of the mind amounts to no more than the activity of compounding, transposing, augmenting, or diminishing the materials afforded us by the senses and experience (Hume 1993, 19).

Note the abundance of activities which, Hume suggests, go on in the human mind. Yet the contents of the thoughts seem to be only or largely materials "afforded" by the senses and experience. Taken in this sense, variation of thoughts would not affect any of the properties of the "empirically given." In his *Treatise of Human Nature*, Hume criticized the view that belief consists of

merely combining new ideas with the set of concepts already established in the human mind. He remarks that:

The mind has the command over all its ideas, and can separate, unite, mix and vary them, as it pleases; so that if belief consisted in a new idea, annex'd to the conception, it wou'd be in a man's power to believe what he pleased (Hume *Treatise*, 623-624).

For present purposes, the most important lesson to be drawn from Hume is that, in giving a satisfactory account of variation, one needs to be particularly attentive to its limitations. On the one hand, the power of variation to affect the properties of the empirically experienced is quite limited. On the other hand, the power of the human mind to form beliefs by mere process of variation seems equally limited. What, then, is the technique of variation?

I will begin by examining the origins of the notion of variation in Locke's thought. One of the results of my interpretation of Locke's notion of variation will be to provide a ground for Locke's distinction between artifacts, mixed modes, and substances. This examination will reveal that Locke's conception of human cognition was, by and large, the source of the notion of free variation in Husserl's phenomenology.

I will continue by giving an account of the roots of free variation in Husserl's *Investigations*. I shall argue that, in order to be able properly to understand Husserl's original and strict use of free variation as a cognitive technique, one has to reach an understanding of the role of variation in his theory of parts and moments.

Subsequently, I will critically examine the development of the notion of free variation in Husserl's thought. According to the understanding of free variation which I advance in this chapter, Husserl's later indiscriminate use of "free variation" and "free fantasy" was a result of a confused and uncritical widening of the scope of his phenomenology.

The importance of free variation in the thought of Adolf Reinach, one of Husserl's colleagues and followers, will be one of my concerns. I will attempt to sketch the role of variation in Reinach's account of a special kind of necessity which he introduced to philosophy, *material necessity*. As well, I will discuss Reinach's understanding of the *a priori* and point to its dependence on the technique of variation.

As well, I will trace what appears to be an activity of free variation in some research topics of contemporary cognitive science. Those topics are: *conceptual combination* and *structured imagination*. By examining them, I will attempt to illustrate that variation, as a cognitive technique, is frequently used by cognitive scientists.

Finally, I will point to crucial role of variation in Ernst Mach's understanding of thought experiments. It seems that the thought experiments based on variation, as opposed to some other kinds, maintain a closer connection to physical reality.

Charter One

Locke's Ideas and Variation: A Jig Saw Puzzle Work of the Mind

(a) Simplicity and Complexity in Sense-Experience

The aim of this chapter is to examine a particular conception, explicitly elaborated by Locke, of human cognition understood primarily as a set of various activities of manipulating simple ideas, producing thereby collections and clusters of more or less complex and abstract ideas. I will describe to what

extent some aspects of this Lockean conception of human cognition represent the origin of the notion of free variation. I would like to claim, additionally, that inquiry into the principles of free variations may help account for the nature and origin of what Locke calls complex ideas.

Several commentators have noted that Locke based important parts of his epistemology on a psychological analogue of the corpuscularian physics of the day. This intellectual background recognizable in Locke's thought draws on a tradition far older than the physics of the time. For example, M.A. Steward points out (Steward 1979, 66) that Locke appeals to letters of the alphabet to explain the combinatorial wealth of complexes of simple elements. Since the time of Democritus, the alphabet had been used as a metaphor for the particles of physics. Here is an account of Democritus' theory, offered in Aristotle's

Metaphysics (A4, 985b4):

Leucippus and his associate Democritus hold that the elements are the full and the void.... These two men say that the difference in atoms are the causes of other things. They hold that these differences are three - shape, arrangement and position.... A differs from N in shape, AN from NA in arrangement, and Z from N in position (G.S. Kirk and J.A. Raven 1964, 406-407).

Locke, in a somewhat different way, uses the alphabet in order to suggest that a potential of human thought is vast and perhaps even infinite, arguing against the possible objection that sensation and reflection may deliver too few elements to account for the rich diversity of thought. He suggests that few simple ideas can, through combination and arrangement, provide a great wealth

of complex ideas, capable of encompassing any possible thought and knowledge that may occur in the mind. Locke claims that it may not be so strange to consider,

....these few simple ideas sufficient to employ the quickest thought, or largest capacity; and to furnish the materials of all that various knowledge, and more various fancies and opinions of all mankind, if we consider how many words may be made of the various composition of twenty-four letters; or if, going one step further, we will but reflect on the variety of combinations that may be made with barely one of the above-mentioned ideas, viz. number, whose stock is inexhaustible and truly infinite: and what a large and immense field doth extension alone afford the mathematicians? (*Essay* 2.7.10).

As well, Locke refers to the simple ideas in a complex having their own "number and order," key relations in the concept of matter, using terminology reminiscent of the Aristotle's account of Democritus.

However, it would be a mistake to interpret Locke's use of the traditional and mechanistic scientific outlooks as being based on a belief that simple ideas occur individually or joined in a linear series. Locke's theory implies that perceived objects are wholes which combine qualities and necessarily possess a particular *structure*, while the ideas they generate in the mind are ideas of the elements of the complex. This may be easily illustrated by numerous passages from the *Essay*, for instance,

Though the qualities that affect our senses are, in the things themselves, so united and blended, that there is no separation, no distance between them; yet it is plain, the ideas they produce in the mind enter by the senses simple and unmixed (*Essay*, 2.2.1).

However, accounting for simplicity and complexity of the ideas is not so easy a task. First, it is not obvious what "simple and unmixed" meant for Locke.

Second, some commentators do not appear to recognize that there are problems with representing ideas, such as the ideas of colour and shape, as simple and unmixed. For example, this is how Steward accounts for this mixture of unity and distinctness associated with simple ideas:

To say at 2.2.1. that ideas, e.g. of colour and figure, enter "simple and unmixed" is to say that (a) each is irreducible of its kind and (b) we cannot possibly confuse them: no one thinks that seeing the colours of the mat is seeing its shape unless he thinks that colours are shapes, nor that it is reducible to seeing something else (Steward 1979, 67-68).

I see problems with the notion "irreducible of its kind." In a sense, of course, colours and shapes are kinds, i.e. the experienced and mature mind can tell colours from shapes and will not think it plausible that one might be reducible to another. It does not follow from this that there is a sense in which these elements *enter* the mind "simple and unmixed," i.e. separately.

Carnap explored this idea of "elementary experience" in his *Aufbau*. He argued that under certain circumstances it is possible to analyze, and in a sense break up, unanalyzable units by the means of "quasi analysis." Quasi analysis parallels the procedure of proper analysis except that its elements do not "really" constitute parts -- one always works with pair lists. Quasi analysis presupposes a pair list of elementary experiences to be given, whose relation extension R has the same general formal property as the relation-extension which forms the basis of proper analysis (*Aufbau*, paragraph 71). Thus, one could use so-called

"compound" chords as a domain of unanalyzable units. As a phenomenon (e.g. given in sensation) a chord is a uniform totality, not composed of constituents. Imagine a perceiver who lives in a purely auditory world in which there are only chords, and no individual tones. Then imagine a chord consisting of the keys *c, e, g*. This chord is akin to all the chords which contain *c* and furthermore to all chords which contain *e* and *g*. Thus it belongs to three chord classes, which creates the impression that it has three parts. Carnap further acknowledges that we are capable of determining "similarity circles," i.e. sets of similar objects, in this way.

In the case of tones and chords, the similarity circles are identical with the quality classes, but normally they are not. One can imagine creating similarity circles by adopting the following procedure: cutting out the geometrical shapes (triangles, circles, squares) of different colours (red, yellow, blue). One could mix the coloured geometrical shapes randomly and form similarity circles by selecting similar objects. This selection procedure may be based not on any "simple" properties (such as the shape and colour) but on the combination of several properties (selecting as similar, for example, the objects of the same colour *and* the same shape).

This procedure, without direct access to the "proper" constituents of examined objects or phenomena, is called quasi analysis. The procedure of quasi analysis, as I have suggested, may be applied not only to chords but also to the classes of coloured shapes. In the case of chords, we assign the classes of *c, e*, and

g as quasi constituents to the chord c-e-g. However, this chord does not, properly speaking, consist of three parts. Instead, it just creates the impression of tripartition, which is the result of an intuitively performed quasi analysis.

Carnap's most important point regarding this kind of Lockean hypostatization of constituents as parts of objects (such as their shapes and colours, for example) is that a quasi analysis enables an examiner to treat constituents not in the sense of parts, but in the sense of directions in which we can proceed from the constituents to the classes of objects or phenomena which stand to one another in the relation of kinship. As Carnap's method of construction shows, it is not *obvious* that the sense specific sensations come in simple and unmixed: they are neither simple in the sense of *primitive* nor simple in the sense of being generated individually.

Locke, however, assumes that simple ideas are both "simple and unmixed" and "blended" at the same time. How does the human mind, to put it in more contemporary terms, run both the operations of recognizing the distinct features as well as that of blending complementary features in cognition? Are there some regularities, some sort of structure in those operations? In order to answer this question, I will raise a couple of related questions.

(b) General Background: Descartes and Locke

Michael Ayers, in his monograph on Locke, sketches the changes in epistemology and theory of science which influenced Locke's thought.

Aristotelians saw the soul as the "form" of the living thing, the principle of life which activates its "matter." In this view, when human cognition functions properly there is conformity or congruity between things as they exist in reality and things as they exist in the mind, in other words between "formal" and "real" existence. Finally, this conformity is reflected in deep linguistic and logical structures.

The so-called "new mechanics," which already figured in Western thought before Locke, was formed in sharp opposition to Aristotle's model of cognition. This new mechanistic hypothesis saw every event in the material world as reducible to motions of matter according to mechanical laws. There was, consequently, little room for the "forms of the mind" dependent on what is perceived or imagined in objective existence. According to Descartes, what occurs in any part of the body can only be the motion of matter. Sense-data can thus only be the result of mechanical occurrences systematically caused by the perceived objects. Beyond this relationship of correspondence there need be no "conformity" or "congruence" of any kind between the object and its corporeal "image." Consequently, this new conception dispensed with the Aristotelian intentional objects or intrinsically intentional states.

However, at this point, the following question emerges: if we dispense with intentional objects and intentional states, how do we then penetrate to the

core or essence of things? If things are represented by nothing but clusters of mental occurrences causally triggered by them why should our ideas reflect their essences and fundamental properties? In what way are they like them; or accurately depict them?

To this question Descartes provided a simple and frankly metaphysical answer. As Michael Ayers phrased it, Descartes believed that "the intellect can spin knowledge from its own entrails" (Ayers 1991, 33) precisely because the intellect was created by God. In the process of creation, the intellect was furnished by innate knowledge of essences and fundamental principles, which also contain sufficient and necessary requirements for understanding experience. In order to reveal and make explicit this implicit knowledge one needs to employ a proper method of analysis. Only then can this knowledge be applied synthetically in the scientific explanation of the world as we experience it. However, one may wonder how this general framework is applied to the objects of perception. Michael Ayers's account of the argument Descartes offered to account for the application of inner knowledge to the empirical world, the famous wax experiment in the *Meditations*, is worth quoting at length:

Descartes pointed out that each and every quality of a piece of wax (including its size, since the wax can appear to expand and contract according to temperature) may be replaced by a different one as circumstances change. His conclusion was that our ordinary idea of wax as something which survives such alteration is the purely intellectual idea of a thing or substance which is extended and mutable. Elsewhere he argued that the change proper to an extended substance is mechanical change, i.e. motion and rest subject to intelligible laws. This looks like a very Aristotelian procedure of stripping off accidents to reveal the simple

essence, extension, and the properties necessarily connected to the essence; but it was for Descartes the application of a wider method. He was following the principle (as Spinoza put it in his exposition of Descartes' philosophy) what is complex and not understood should be broken down into what is simple and intelligible and evidently true (Ayers 1991, 33).

Plainly Descartes, in his experiment, followed a wider method of breaking down the complex and obscure into the simple and intelligible. However, I see Descartes' method differently. Following the central thesis of my dissertation, I will call this procedure "free variation," aimed at revealing simple essences by altering the accidents. After all, Descartes *replaced* each and every sensible quality of a piece of wax by a different one as *circumstances change*. Consequently, I believe that it would be more accurate to say that Descartes *varied* the accidents rather than "stripped the accidents off." If one were to strip the accidents off one would as a result reach the more general and abstract genera. As we will see later in this chapter, this view of framing abstract ideas was developed and defended by Locke. Additionally, it is not clear how one could actually "strip the accidents off."

To *vary* the accidents of certain objects, as opposed to stripping them off, is to discover properties necessarily connected to the essence of that object. In the process of varying, one's mind is synthesizing: one has to be aware of the identity of the chosen object while that object undergoes, in some cases numerous and deep, changes. In Descartes' experiment, the wax is first hard and cold, it has very recently been taken from the honeycombs, it has not as yet

lost the fragrance of its honey, it makes a sound if you rap on it with a knuckle. If brought close to fire, the odour vanishes, the colour is changed, it becomes hot and liquid, and does not emit any sound when you knock on it. One notices that almost all of its properties vary with the change of temperature. One could further imagine the ways in which the properties of wax would vary with the change of pressure, chemical environment and so on.

Locke's approach to the structure of knowledge was very similar to the Cartesian in some respects and quite opposed to it in others. The fundamental disagreement between Locke and Descartes is the following: Locke did not believe that there was a way of moving from the complexity of experience to the unitary essence or core of the object as it is in itself. The only way to cognize a substance, according to Locke, is to experience accidents (sensible qualities) together with the obscure idea of something to which they belong. Since we can have no knowledge of the essence of things, we must rest with ideas of things which are logically composite, combining the idea of an unknown substance with the ideas stemming from the realm of the experienced.

The way in which those composite ideas arise is yet another point of disagreement between Descartes and Locke. For the former, composite ideas are formed by the paradigmatic simple ideas which are innate and for the latter simple ideas stem from the senses. Because of this disagreement, Locke and Descartes had radically opposing views on what should count as "simple" and what should count as "complex" in cognition. Colour, for example, would be

simple for Locke and complex for Descartes. The general and determinable concept of extension would be a "simple notion" for Descartes, whereas for Locke this concept would fail to satisfy his definition of simplicity.

Note that compositionality, i.e. the doctrine that complex ideas are composed out of simple ideas, has nothing to say about what ties thought to reality: one may subscribe to compositionality and believe either that there are innate structural and interpretive principles or that there are reliable experiential building-blocks.

For Locke, simple ideas are necessarily elements of any true account of the experience. This is so since the terms employed in such an account get their meaning precisely by association with such elements of experience, alone or in combination. One might additionally say that the determinate combination of sense qualities does not manifest something about the "real" substantial nature, it instead constitutes the nominal "essence" of the object by means of genus and species difference. The next section of this chapter will examine Locke's attempt to produce a taxonomy of the nominal "essences" produced by the combination of sense qualities.

(c) The Active Power of the Mind in Locke's *Essay*

One feature of Locke's thought, which is generally recognized by his commentators, is his emphasis on the active role of the mind. However, Locke's

empiricist epistemology required some further qualification of this role of the mind: the mind is not capable of inventing simple ideas. Consequently, the mind has to be receptive, at least in respect to simple ideas.

Locke's simple ideas are classified according to their origin in sensation and reflection. There are four classes of them received from the following four sources: one sense only, several senses, reflection only, or both sense and reflection. Colours and tastes would belong to the first class and extension, rest, and motion to the second. Reflection leads to a special group of ideas such as perception, memory, or thinking, which include the acts of remembering, knowing, discerning, etc. The fourth group combines reflection and sensation producing the ideas of pleasure and pain, power, succession, and others. All other ideas result from various combinations of these primary ones, and all knowledge is framed with their help. It has been suggested that Locke's classification of ideas in book II of his *Essay* should be understood as a deliberate attempt to set up a doctrine of categories which would be a rival of the traditional scholastic doctrine of categories (Ayers 1991, 23).

The active powers of the mind come into play in the formation of new complex ideas. Locke recognises the following relevant acts of the mind in formation of complex ideas: combining, comparing, and separating. This should be taken not as an exclusive distinction since any act of comparing, for example, would naturally imply some sort of combining and separating, coupled with at least some level of abstraction.

Locke classified the results of all possible cognitive operations under three headings: modes, substances, or relations. He defined *modes* as "[complex] ideas which, however compounded, contain not in them the supposition of subsisting by themselves, but are considered as dependencies on, or affections of substances" (*Essay*, 2.12.4). *Substances* are: "[combinations] of simple ideas as are taken to represent distinct particular things subsisting by themselves" (*Essay*, 2.12.6). He provides an example of the idea of lead: it is formed by joining the simple idea of certain dull whitish colour with the idea of hardness and coldness. One should perhaps add that in the case of substances the mind appears to receive particular combinations of ideas by the very act of experiencing. *Relation* is defined as consisting in: "[the] consideration and comparing one idea with another" (*Essay*, 2.12.7).

I will begin by examining Locke's understanding of variation and continue by examining substances, contrasting them with the mixed modes and with the artifacts, and close this chapter by discussing his theory of abstraction.

(d) Locke's Understanding of Variation

As far as variation is concerned, Locke seems to confine it entirely to simple modes. He terms the simple modes variations, or different combinations of the same simple idea, without the mixture of any other ideas. In his own

example, a dozen is the idea of so many distinct units added together in an operation of simple variation, or combination.

Of these modes there are two sorts which deserve distinct consideration: First, there are some which are only variations, or different combinations of the same simple idea, without the mixture of any other... (*Essay*, 2.12.5).

As R.S. Woolhouse points out, (Woolhouse 1983) it is not entirely clear whether "variation" and "combination" are meant to be two things or just stylistic variants of the very same concept. Woolhouse proposes an interpretation of Locke's simple modes which allows for attributing different meanings to variation and combination. In that case, Locke's example of the dozen may be termed "combination," since a dozen implies not twelve ideas of a single thing but rather a single idea of twelve things. In other words, this mode combines various substances or simple ideas into one idea. However, Woolhouse understands Locke's treatment of "variation" in a different light: "Talk of 'variations', on the other hand, is given content by a different range of cases. There are ones where the relation between simple modes and simple ideas is akin to that between determinates and determinables" (Woolhouse 1983, 119). To illustrate the difference between determinates and determinables, let me take the following example: "having a mass of one pound" and "having a mass of one and a half pounds." These two properties have something in common in one sense yet they differ in another sense. In platonic interpretation two things with different masses still have something in common - a property which they share

(that of having a mass). This which they have in common is called determinable; the two distinct properties not shared by two things (those of having a mass of one pound and having a mass of one and a half pound) are called determinates.

The most important difference between combination and variation is the following: combination appears not to involve any sense of genus-species dependence. Any twelve objects, for example, can constitute a dozen. However, the case of variation seems to require some sort of genus-species dependence. While talking about the latter, Locke (*Essay*, 2.18.2.) uses the term "modification" mentioning sliding, walking, tumbling, creeping, etc. and presenting them as variants of the general concept of a certain species (man) doing all of these things. It seems that he believed that we have the ability to form simple and distinct ideas of particular events of movement, having in mind the more abstract idea of motion. At the same time, this more abstract idea of motion is formed by observing those simple ideas and comparing them. There is a certain sense here of mutual dependence between abstract or general and simple or particular.

Locke also uses the example of particular sounds, modification of which in one's mind leads to more abstract entities - tones, harmonies, and chords. Much like the case of motion, there seems to exist a mutual dependence between sounds (particular) and tones (general):

Sounds also, besides the distinct cries of birds and beasts, are modified by diversity of notes of different length put together, which make that complex idea called a tune, which a musician may have in his mind when he hears or makes no sound at all, by reflecting on the ideas of those sounds, so put together in his own fancy (*Essay*, 2.18.3.).

This understanding of variation, which seems to suggest that the human mind is capable of producing complex ideas by freely combining the simple ones, has some important implications in Locke's thought. It leads to yet another mode of variation which is implicitly used by Locke. This mode of variation involves replacement of simple ideas in complex substances. For example, when Locke considers complex ideas of substances (*Essay*, 2.30.5.) he points out that complex ideas of substances are real when they agree with the existence of things.

Fantastical creatures, on the contrary, are made up of such collections of simple ideas as were really never united. This occurs, for the most part, when one modifies some parts of the known and existing substances. One can, for example, take a substance such as a horse and vary some of its parts in imagination. If one took a human head and put it in place of horse's head, one would create a centaur.

(e) Substances and Mixed Modes

Locke characterizes particular substances in the following manner: they stem from the general idea of substance, which is the basis of all existing qualities. He does not have much to say about substance in general except that

it supports, in some unknown manner, all existing qualities. In other words, we cannot imagine the existing qualities without something to "uphold" them (*Essay*, 2.23.2.). Locke does not dwell on this abstract and confused idea, he hastens to particular sorts of substances. Particular substances collect such combinations of simple ideas which are taken as existing together by experience and observation:

An obscure and relative idea of substance in general being thus made we come to have the ideas of *particular sorts of substances*, by collecting *such* combinations of simple ideas as are, by experience and observation of men's senses, taken notice of to exist together; and are therefore supposed to flow from the particular internal constitution, or unknown essence of that substance. Thus we come to have the ideas of a man, horse, gold, water, etc.; of which substances, whether any one has any other *clear* idea, further than of certain simple ideas co-existing together, I appeal to every one's own experience (*Essay*, 2.23.2.).

Locke does not offer much justification or explanation of the notion that certain simple ideas always exist together, he simply appeals to experience and common sense. In other words, he seems to claim that, by routinely collecting certain combinations of simple ideas, we become convinced that the properties of these combinations flow from the particular internal constitution, or unknown essence of that substance.

Examples of particular substances such as gold and sun appear quite uncontroversial. In the case of sun, one's experience collects, with little ambiguity, warmth, brightness, roundness, and typical shades of colour associated with sun (bright yellow, red, etc.). Therefore, the experience of this particular substance appears to be quite regular. An example at the other end of

the scope of difficulty would be complex and compounded ideas constituting the substance of a swan. As Locke points out, the idea of a swan compounds white colour, long neck, red beak, black legs and whole feet, and all these of a certain size, with a power of swimming in the water and making certain noise (*Essay*, 2.23.14.). One should perhaps add that swan's neck is curved in a typical manner. It seems that the nature of swan's substance is quite complex and loosely determined. Locke did not say, for example, what are the limits of the length of swan's neck. If one varied the length of its neck and perhaps some other of its features, one can imagine converting swan into a goose or a stork.

Mixed modes involve a higher level of abstraction. Beauty would be an example of a mixed mode, i.e. a mode compounded of simple ideas of several kinds, put together to make one complex idea; it may, for example, consist of a certain composition of colour and figure causing delight to the beholder. Mixed modes differ from substances in several important respects. First, they are distinguished from substances and from simple ideas by not referring to really existing things. Second, the framing of complex ideas in a mixed mode proceeds in a somewhat arbitrary manner in contrast to the framing of simple ideas of substances. In other words, mixed modes are framed by putting together, in one's mind, scattered and independent ideas, whereas substances are formed by joining ideas that belong together "naturally."

From this brief contrast between mixed modes and substances it follows that mixed modes are not ideas of material things. They have no unity in nature

and are largely independent of nature. Locke suggests that mixed modes are conventional or institutional. He uses terms such as "lie," "obligation," "hypocrisy," and "sacrilege" to show that mixed modes are largely institutional in nature. However, this does not mean that modes are compounded in an arbitrary manner. What are the principles, then, under which mixed modes are formed and changed? It seems that the very existence of mixed modes is dependent on their being defined in a certain way by various societies and cultures, in sharp opposition to substances which exist independently of people recognizing their existence.

Mackie attempted to illustrate the difference between substances and mixed modes by discussing the difference between a suicide (a mixed mode) and gold (a genuine substance-term). The best we can do in defining mixed modes, such as suicide, is to produce a sufficient and necessary condition for recognizing a certain act as an act of suicide. However, we could always change the particular terms and circumstances used to describe suicide (for example, we may talk about one's emotional conditioning or else about certain kinds of social pressure). Consequently, the counterfactual "scenarios" employed to describe suicide would in each case be different. One could readily postulate that there are various kinds and types of actions which would count as suicide. However, with genuine substance terms, the situation is quite different. In Mackie's words:

If we have framed and confirmed a theory about the atomic structure of what we now recognize as gold, and then consider (regarding it still as counterfactual) the possibility that some material with a different atomic structure should mimic all the really detectible properties and powers of gold, we are most likely to refer to this not as the possibility that there should be an additional kind of gold, but rather as the possibility that something which is not gold should be very like gold" (Mackie 1976, 91).

Mackie further points out that, when it comes to "framing" (naming, or defining), Locke's distinction between substances and mixed modes does not hold fast. To illustrate this, let me consider the case of artifacts, which are the source of number of problems for Locke's distinction.

(f) Artifacts, Mixed Modes and Substances

Locke talks about invention as an activity which puts together several simple ideas in some new and original ways: "so he that first invented printing and etching, had an idea of it in his mind before it ever existed" (*Essay*, 2.22.9). Once invented, a printing press becomes a common object, existing in reality. Should one say, then, that artifacts have a miraculous capability of descending from a laboratory of someone's mind right into the real world?

A table, for example, is a substance, but the notion of "picnic table" belongs somewhere in between substances and mixed modes. To represent a picnic table as a substance would imply taking "picnic" to be a simple idea. One has to remember that Locke defined substances as particular objects consisting of simple ideas. On the other hand, a picnic table cannot be taken as a mixed

mode in the strict sense of that term since one can always point out that a picnic table is, after all, a particular object with quite characteristic properties.

In determining whether artifacts should be seen as substances or mixed modes, one seems to confront the problem of defining the objects which are largely determined by their functions, i.e. by conscious human purposes. For example, a log turned on its side can serve as a picnic table. The difference between this log taken as a substance (a chunk of particular kind of wood) and as a mixed mode (an object which belongs to the notion of "picnic table") is primarily a matter of representation. An oak or a fir log may be represented as such by someone who does not know any of its possible uses. But once we consider its use, e.g. as a picnic table, it represents a mixed mode. This is particularly true of things such as a log; the same physical object may be used to serve several purposes, such as ballast, a car prop, fire wood and so on. Additionally, the difference between any object taken as a substance and as a mixed mode can be seen as a difference in one's approach to testing the nominal essences of ideas. This account would make Locke's distinction between substances and mixed modes tenable even in the case of artifacts. However, one would have to add that the difference between substances and mixed modes, at least in the case of artifacts, does not lie in the ideas themselves but in reasoning about ideas.

On the one hand, the nominal essences of certain objects may be discovered by abstracting and combining ideas merely by thinking. According to

my previous example, one would be capable of determining whether a normal log can, in principle, be seen as a "picnic table" by variation; we imagine it set on its side, rotate it in the mind. One could also determine that a coffee cup could belong to the set of objects capable of being "picnic table" if one is prepared to mentally vary its size. However, in the case of a dust ball, for example, one would have to perform too many adjustments in the course of free variation in order to make a dust ball into an object capable of serving as picnic table. The nature of all these testing procedures, which belong to mixed modes rather than substances, makes empirical testing not only unnecessary but superfluous.

Other types of testing require observation and experiment, as opposed to testing by mere thinking. For example, to test whether some log's substance is oak would involve empirically examining its texture. In this case, mere thinking used as a testing procedure would produce very poor results.

I would like to further generalize this distinction between these two procedures of testing, drawn in respect to discovering the nominal essences. In Locke's epistemology, the scope and nature of complex ideas belonging to modes is, in principle, tested entirely in the mind and by the mind. This comes as a natural consequence of Locke's defining mixed modes as complex ideas which don't contain in themselves the supposition of subsisting. Therefore, it would not be reasonable to inquire into the nature of modes empirically.

For example, to test which objects and which actions potentially satisfy complex ideas such as "lie" and "justice" one does not look around in order to

discover an empirical measure of deceiving statements and just actions. In case of justice, for example, the best one can do is to mentally vary a particular instance of a given action against the background of some other known and similar actions which are typically considered just.

Locke readily concedes that the complex ideas, belonging to mixed modes, are formed in a somewhat arbitrary manner. Thus, it is possible that the perception of justice and beauty may vary from society to society. Since the abstract ideas of mixed modes are not based on rigid standards, Locke inferred that they must be based on tradition and custom:

That the abstract ideas of mixed modes, being men's voluntary combinations of such a precise collection of simple ideas, and so the essence of each species being made by men alone, whereof we have no other possible standard existing anywhere but the name itself, or the definition of that name; we having nothing else to refer these our ideas of mixed modes to, as a standard to which we would conform them but the ideas of those who are thought to use those names in their most proper significations; and so as our ideas conform or differ from them, they pass for true or false (*Essay*, 2.32.12).

However, there are obvious limits to the kind of conventionalism he endorses. In order to cast doubt on the view that mixed modes arise merely through the adopted usage of certain combinations of terms it suffices to consider the abstract ideas in mathematics.

(g) Locke on Abstraction

There are two basic and primary functions of language, according to the *Essay*. The first one may be called *expressive*, i.e. the language serves the function of expressing ideas in the mind of the speaker. The second one is a *communicative* one, i.e. the language is used effectively to communicate thoughts. The second function of language requires the use of general terms. This is what would happen, in Locke's words, had people been unable to use general terms in communicating: "Men would in vain heap up names of particular things, that would not serve them to communicate their thoughts" (*Essay*, 3.3.3).

Since general terms are indispensable for communication and since people express ideas by using language, it follows that general terms must be expressing general ideas. However, Locke's empiricist tenet that all ideas derive ultimately from particular elements of experience makes it difficult to see how general ideas are formed out of particular sense-impressions. In order to solve this problem, Locke had to generate an useful and convincing theory of abstraction.

We notice certain recurring features in the immense variety of sensory stimulations to which we are continually subjected. For example, we notice something similar in the visual experience of the piece of chalk which we see today and the jug of milk which we saw yesterday. We pick out this feature of the complex sensory patterns which we receive, isolate it from the features which accompany it on the particular occasion of perceptions and assign a name

to it. Thus we ignore the shape of the chalk, the taste of the milk, etc. but instead focus on their "whiteness." By doing so, we build a standard or pattern which enables us both to apply the term "white" and to classify something as white. This is a concise description of Locke's theory of abstraction, given by Mackie:

Locke's basic theory of abstraction, then, is that it consists in paying selective attention to one feature in a complex particular object of experience and ignoring the other features which are in fact occurring along with it, and in associating verbal expressions (or other signs) with the selected feature in such a way that one is ready to apply them to other objects that are like this one with respect to this one feature (Mackie 1976, 112).

Locke believed that this omission of properties can proceed in stages until we reach the most abstract terms which would be the most vacuous one, or the ones containing the least properties:

Of the complex ideas signified by the names man and *horse*, leaving out but those particulars wherein they differ, and retaining only those wherein they agree, and of those making a new distinct complex idea, and giving the name *animal* to it, one has a more general term, that comprehends with man several other creatures. Leave out of the idea of *animal*, sense and spontaneous motion, and the remaining complex idea, made up of the remaining simple ones of body, life, and nourishment, becomes a more general one, under the more comprehensive term, *vivens* (*Essay*, 3.3.9).

One can hardly avoid noticing that both the scope and kind of examples and the underlying method behind the examples presented in this quote look Aristotelian. This is not surprising since Locke, although an enthusiastic critic of the scholastic tradition, received his education in the tradition of scholastic logic. This particular strategy of reasoning stems from Aristotle's doctrine of

"predicables" (species, genus, difference, property, and accident). According to this doctrine, the intellect can penetrate to the core or essence of the substance, achieving an understanding of a unitary network of attributes necessarily connected to that core.

This is, in short, Locke's theory of creating general ideas by the process of abstraction; it has often been criticized, from Berkeley onward. One possible objection consists in pointing to its circularity. If a recurrent aspect of particular sense-impressions is picked out and made general by being separated from those other various aspects which necessarily accompany it then that aspect is something general by its nature. In other words, the recognition of that aspect presupposes the ability to classify and sort out sense-data, which is the ability that Locke's theory of abstraction is supposed to explain.

Abstraction is explained by the ability to notice similarity and to ignore other irrelevant features. However, there are two theories of abstraction. The first one may be attributed to Locke, the second to Carnap. Locke's theory of abstraction holds that we notice similarity in certain respects which holds between two or more objects. Therefore, this understanding presupposes that the respects in which objects or phenomena are similar are "built" into those very objects or phenomena. This theory is riddled with problems. One of the most obvious, as I suggested above, is its circularity.

According to Carnap, we notice that two or more things are just similar and that is sufficient to generate abstract concepts. In order to be able to

analyze similarity of objects or phenomena without committing himself to identification of their constituents, Carnap employed the following strategy. He believed that did not need to identify "respects" before discovering similarity because he interposed similarity circles between elementary experience and quality classes. Similarity circles are sets of objects that are just similar, e.g. a red triangle, a blue triangle, and a red square are a similarity circle formed by starting with the red triangle; there is no quality that they *all* share. Carnap then proceeds to forming quality classes from similarity circles.

Another objection to Locke's theory of abstraction is that it simply assumes that things resemble one another in various respects and that we can observe this, even when the two partially alike things are not present at once. In order to illustrate the indeterminacy and open-ended nature of the notion of resemblance, let me examine one of the simplest examples: comparing books A and B, physically present in front of the observer. These two books may be considered more or less similar or equal. If they are not considered equal then they can resemble each other in various respects: first by being books, second by having approximately the same number of pages or being written in the same language, etc. Let us assume that they resemble each other in being two copies of the same edition of a book, the closest possible form of resemblance. Consequently, whatever can be truly said about the salient features of A can be truly said about salient features of B. For example, whatever is said truly of the number of letters on any given page in case of A must hold in case of B.

However, there is a number of changes that A and B may have undergone, i.e. changes which do not affect any of its salient features. Imagine that A has some pages underlined and that B belongs to a library. We could nevertheless say that the pattern of underlining in A resembles that in B. However, the latter properties of A and B are considered irrelevant for their being two copies of the same book. As we have seen, determining in which aspects two objects, A and B, are judged to be equal also determines which properties of these object are to be considered salient and which ones are not. "Mere" resemblance fails to constitute any salient features of objects.

The third major criticism of Locke's theory of general ideas attacks his very concept of ideas. In Locke's terminology, it is not clear whether he is referring to having a sensation of white or to thinking about a white object. This ambiguous use of the term "idea," most commentators agree, was deliberate on Locke's part. The danger of this use is in the temptation to think of the perceiving of grey, for example, as differing from the conceiving of black only in having more specific content. This confusion is the result of Locke's attempt to maintain the continuity of perceptions, images, and abstractions. Perceptions would, therefore, become conceptions through omission of context. In Locke's terminology, all of this occurs under the general heading of ideas: experience consists of ideas let into the mind by the senses, memory consists of ideas lodged in memory, abstract ideas consist of the ideas being transformed by the mind. Yet one would tend to think that identifying perceived quality of colour with the

idea of colour does not solve, but rather additionally confuses, the problem of creating general ideas.

However, despite of all its shortcomings Locke's theory of abstraction is quite relevant for understanding the activity of free variation. For one thing, Locke used free variation in his *Essay* in order to address the difference between "real" and "nominal" essences. Locke held that the essences of species are nothing other than the abstract ideas we have in our mind. Had it been otherwise, we would not have been able to determine which alterations may be or may not be made in a *horse* or *lead* without making either of them to be of another species:

And therefore the supposed real essences of substances, if different from our abstract ideas, cannot be the essences of the species we rank things into. For two species may be one, as rationally as two different essences be the essence of one species: and I demand what are the alterations [which] may, or may not be made in a *horse* or *lead*, without making either of them to be of another species? (*Essay*, 3.3.13).

The only creature capable of manipulating real essences would be God, in the very act of creation in which essences of the things would be created and annihilated with the creation and dissolution of the individual things which they constituted. However, human beings are only capable of grasping abstract ideas which, in turn, are created by the human mind. Locke points out that even a moderate skill in different languages reveals that certain complex ideas collected in one language under a single name may not be collected into any specific ideas in some other languages (*Essay*, 3.5.8.). The latter shows that abstract ideas are

creatures of the human mind in linguistic practice. However, the best way to prove, in principle, that the abstract ideas are nothing but creations of the human mind is to make use of a minute and readily employable strategy: varying certain features in our abstract ideas to examine the nature and scope of those ideas.

This strategy of free variation proves to be quite effective in the case of substances. Additionally, the latter case makes it reasonable to accept Locke's distinction between real and nominal essences. An animal, such as a horse for example, has a nominal essence, i.e. certain properties which we usually associate with the notion of "horse," as opposed to the real essence, which consists of the fundamental arrangement of particles or some sort of internal constitution on which all those properties depend.

However, in the case of mixed modes it is not always clear how to employ the distinction between real and nominal essences. On the one hand, it is obvious that nominal essences of modes have to do with what we mean by the idea we have of that particular mode. As I attempted to show in the previous section of this chapter, it may be claimed that modes owe their existence to the fact that their nominal essences are tested entirely in the mind and by the mind. But what about real essences? Are modes supposed to have any real essences? Locke speaks about the real essences of modes. Here is just one of several passages concerned with real essences and mixed modes: "Another thing we may observe from what has been said is, That the names of mixed modes always

signify (when they have any determined signification) the real essences of their species" (*Essay*, 3.5.14). At some other places (3.3.18.) Locke states that real and nominal essences coincide in the case of mixed modes. For example, if we know the essence of a triangle, we can potentially deduce the rest of its properties. Therefore, the real essence would, in this case, only be the nominal essence fully expressed in its definition.

In the case of triangles, it is attractive to suppose that they have their properties (their internal angles are equal to two right angles, etc.) as a result of their real essence. In this case, we can think of a real essence as a specification, or a set of instructions for constructing a certain geometrical figure. However, there are more controversial cases such as the mixed modes "beauty," "lies," and "patricide" (to mention just a few Locke's examples). If one were to see their nominal and real essences coincide, then one would insist on the mutual dependence between the principles upon which these terms are constructed and these term's essential properties. However, there are two difficulties with this view. First, it may be difficult to distinguish between the fundamental principles and properties of mixed modes. Thus, one may claim that what is originally seen as a property of a triangle (an object with internal angles which are equal to two right angles) may in turn be used as a principle for constructing a triangle. This difficulty is even more pressing in cases such as "beauty" and "justice." Second, and more general, the difficulty is that mixed modes which

capture complex ideas stemming from, for example, the sphere of social behaviour may have no rigid fundamental principles.

(h) Conclusion

Let me close this chapter with the case which caused the most difficult problems for Locke, and which was chosen by his critics as the easiest target for attack. Locke maintained that the mental operations of abstracting and relating ideas are necessarily guided by certain deliverances of experience. He held that "nature" has made things alike in certain respects. The mind has a capability of signifying many particulars only on the grounds of the testimony of sense to the presence of a likeness or similar qualities in a number of individual existent. This presumed likeness is the regulator of the abstraction and generalization, and their application to appropriate members of the species.

This balance between sense-perception and the mental operations of abstraction and generalization holds reasonably well in the case of taxonomies such as the ones drawn on the principles of botany and zoology. Even there, one would have difficulties in establishing the general idea pertaining to any natural kind. "Man," for example, would have to be neither tall nor short, neither dark haired nor grey, and so on. Moreover, with the mathematical ideas and the species of natural substances Locke encountered grave difficulties. Here is Locke's characterization of the general idea of triangle:

For example, does it not require some pains and skill to form the general idea of a triangle (which is yet none of the most abstract, comprehensive, and difficult,) for it must be neither oblique nor rectangle, neither equilateral, equicrural, nor scalenon; but all and none of these at once. In effect, it is something imperfect, that cannot exist; an idea wherein some parts of several different and inconsistent ideas are put together (*Essay*, 4.7.9).

This particular claim, that "general idea of a triangle" must be "all and none" of the several types of triangles at once represents a confused and inconsistent claim. One can only sympathise with Berkeley's insistence that it is utterly impossible for someone to have and not to have an idea of a triangle in his mind.

Berkeley emphasized the impossibility of collecting, in one's mind, all of the properties, and none of the properties, of a triangle as a general idea: "In effect, it is something imperfect that cannot exist, an idea wherein some parts of several different and inconsistent ideas are put together" (Berkeley *Principles*, 32).

However, if one were to approach this problem in terms of free variation, most of the difficulties would disappear. One would have to begin making a sharp distinction between observing triangles (and in this sense having ideas of several different particular triangles, according to Locke) and cutting up and recombining ideas of triangles in the mind. In observation, some triangles are equilateral, some are not equilateral, some are scalene, some are isosceles, etc. If one were to reason about triangles solely by the means of observation, it is possible to imagine that one could not be aware that certain properties of the

general triangle are inconsistent with one another. In other words, one would simply encounter representations of several particular instances of triangles.

On the one hand, in mentally varying (recombining) particular properties of triangles one appears to have discovered certain limitations essential to constructing a triangle. Only in the process of variation, as opposed to sense-perception, one becomes aware that there are limits to varying properties of a triangle. For example, one may attempt to mentally construct a triangle as scalene and vary some of its properties in order to test whether a scalene triangle can be continuously transformed into an equiangular triangle. Only in this sense can Locke's infamous claim, that none of the mutually inconsistent properties of triangles can exist at once, be taken seriously. Another corollary of employing variation in constructing Locke's triangle is the dissolution of Berkeley's criticism of Locke. In simple terms, Locke was not talking about the *actuality* of combining various ideas, some of which may turn out to be inconsistent. Instead, he was talking about the *potentiality* of such combination in the sense in which one can potentially ascribe two or more inconsistent properties to the same object.

On the other hand, in the course of varying (recombining) ideas one appears simply to follow the rules essential for constructing a triangle. However, there is always freedom in the process of implementing the rules. For example, one may never complete an imaginary construction of any particular triangle. As well, one may toy with various elementary properties of a triangle.

This would be a plausible way of understanding Locke's claim that one is having, at least potentially, all of the properties of triangles at his disposal.

This seemingly paradoxical mixture of freedom and restraint in free variation will be of particular interest for the next chapter, which will examine the discovery and application of this idea in Husserl's phenomenology.

Chapter Two

Free Variation in Husserl's Phenomenology

(1) Introduction

This chapter will focus on a single method or, more accurately, a cognitive strategy frequently used in phenomenology: free variation. Although free variation received some attention by Husserl scholars, I believe that there is a need for greater clarification and more precise examination of this cognitive strategy. I will thus examine its origin and its development in Husserl's work. I believe that, by doing so, I will be reviving and recovering one of the best elements in phenomenological inquiry. As well, I believe that this discussion

will prove to be relevant for the study of other contemporary philosophical issues.

Free variation has often been used by phenomenologists as a means of moving from the "natural attitude" to rigorous phenomenological descriptions. Completing this move convincingly and completely has been one of the most difficult tasks in phenomenology. That is the primary reason why phenomenologists have often been ambivalent about the role of the natural attitude.

On the one hand, they acknowledge that the natural attitude has been qualified in most philosophical traditions and doctrines as a set of mere opinions, often erroneous and always volatile. Philosophers have sometimes called this mode of knowledge "doxa." In simpler terms, this knowledge roughly encompasses the domain of "common sense." It traditionally carried very modest authority and it was seen as a ground for opinions, but not for knowledge.

On the other hand, phenomenologists would still like the natural attitude to serve as the broadest and the most fundamental basis or ground of belief. In order to enable the natural attitude to serve the latter role, phenomenologists strove to transform or to "distil" the natural attitude using procedures such as "bracketing" and free variation.

Phenomenology was conceived by Husserl as a rigorous, descriptive, eidetic science. Phenomenological descriptions constituted the most fundamental method of capturing essences. Consequently, phenomenologists do

not argue, they describe. In other words, they do not revise their beliefs on the grounds that their judgments have been true or false; they *redescribe* their beliefs and keep adjusting their descriptions in accordance with the experiential evidence. The nature of their descriptions is such that they have to be as rigorous as they can possibly be. One has to bear in mind that the mathematical ideal of rigour has always been one of the pivotal elements of phenomenology.

Husserl, and indeed most phenomenologists, also maintained that phenomenology captures some of the most fundamental features of all scientific endeavour. First, he maintained that all sciences are constituted by means of some sort of eidetic intuition, or insight, into meanings. Although science, as an empirical enterprise, primarily accepts conclusions which agree with the observed facts, "bare" facts alone, as disclosed in the natural attitude, have no scientific significance apart from insight into their essential meaning. Second, he believed that all scientific meaning consists in the process of abstracting and idealizing from the basis of the prescientific level of meanings.

Both claims have been vigorously attacked by contemporary empirically minded philosophy of science and philosophy of mind. Generally speaking, Husserl's presuppositions run counter to the empiricist project of naturalizing epistemology and science. Naturalized epistemology does not favour meanings and essences and relegates them to "folk psychology."

Since phenomenologists, by their own decree, start their descriptions from the natural attitude, there is a strong need in phenomenology to develop some

way of advancing beyond that stage. Various kinds and levels of phenomenological reduction have been employed to overcome this problem. One of the easiest and most natural ways of illustrating a phenomenological reduction or to engage in one, is to engage in free variation.

The naturalness of free variation also explains why it has always had a high pedagogical value in phenomenology. Students are usually invited to perform a series of imaginative variations in their minds. By doing that, they learn to look at the objects discovered and constituted by the natural attitude as nothing but mere phenomena. Additionally, they learn to place the existence of the world in suspension, making thereby a transition from the natural attitude to the attitude of transcendental phenomenology.

This introduction into the place and role of free variation should not induce the reader to believe that free variation is, and has always been, a well defined concept. Quite the contrary. It seems to have eluded not only a commonly shared definition, but even a common name. It has been variously referred to as "free variation," "boundless variation," "eidetic variation," "free eidetic variation," "free fancy," "free fantasy," and so on.¹

¹ Husserl deals with variation in the *Investigations, Experience and Judgment*, and *Formal and Transcendental Logic*. In the *Investigations*, references to free variation are scattered throughout the whole second volume. Variation is used in analyses of instances of inseparable contents, e.g. visual quality and extension and their relation (p. 440). Also, the variation is used to test interdependence of intensity and quality (p. 441). Free variation is then employed to define isolability (p. 443) and to define the notion of aggregate, i.e. how it happens that the aggregate is indifferent to its matter (p. 480). Finally, free variation is used to account for a possibility of varying both act-quality and act-matter in judgments (p. 586).

In *Experience and Judgment*, Husserl examines free variation as the foundation of essential seeing (p. 340). He considers in some detail the arbitrary structure of the process of the formation of variants and the process of retaining the multiplicity of variants as the foundation of essential seeing. As well, congruence

Before I proceed, let me outline what I take the term "free variation" to mean. It is an activity of varying, in one's mind, certain aspects of a mental image or an idea. This sort of varying is free, first, because of its ideal character - it is not limited by any concrete circumstances and its elements are not bound by any concrete contingencies (such as the time, place, or details of its execution) - and, second, because it can be continued indefinitely.

Take, for example, imagining a human face. By attempting to change more or less diverse details of that imagined face one soon discovers that it is possible to vary it, for example, with respect to its race, gender, and age. This discovery sets the grounds for determining the essential qualities normally associated with a human face. We will see, later in this chapter, that Husserl used the term "moment" to signify these essential qualities.

Determining which moments naturally belong to a human face is by no means an *a priori* matter. Some moments, such as race, gender, and age are more typically and more saliently attributed to human faces. Some other moments, such as "nutritional physiognomy" (i.e. a human face may exhibit various levels of nutrition ranging from obesity to severe undernourishment) may be less typical and salient. Perhaps one might argue that the moments

in difference in variation (p. 346) and the differences between variation and alternation (p. 347) receive some attention.

In *Formal and Transcendental Logic*, Husserl deals with variation under the heading "Universal philosophical significance of the method that consists in uncovering constitution in consciousness" (p. 249). He talks there about the "eidetic method," i.e. the method of revealing the *eidōs* by the means of "ontic variation of a suitable example."

such as "nutritional physiognomy" are less essential, since they are subject to relatively quick change.

By choosing any of these "salient" moments one has implicitly made the commitment to provide all the necessary adjustments of the secondary features which are, by their nature, dependent on the essential qualities. For example, if one chooses to attribute oriental features to the neutrally imagined face, that choice entails certain variations, i.e., shape of the eyes, position of the cheekbones, colour of hair and so on. As well, gender also entails different eye shapes, lips, and the general structure of the facial bones. Finally, if one imagines a face of an elderly person, this invokes certain features of the skin, somewhat enlarged earlobes and nose, etc.

At any point, however, one is free to change the original parameters of free variation or to stop the process of varying altogether. This at times cursory and erratic manner of varying thoughts and images occurs also in everyday situations. Imagine seeing a vaguely familiar face in the crowd of people. It is quite customary to alter some features of this face or to vary some other faces against it in order to determine the source of familiarity. For example, one may wonder which parts of that vaguely familiar face of a passer-by should be modified in order to strengthen the familiarity. So, one might say: "Look, this person looks just like Wittgenstein. It's just the colour and shape of his hair that obscures the familiarity." Alternatively, one can attempt to clarify what appears to be a vague sense of familiarity in the following way: "Look, this face looks

familiar. Does she remind me of a popular actress, an influential TV commentator, or my former university professor?" In this latter case, one would apparently keep the original face constant in one's mind and attempt to vary the possible sources of familiarity against it.

This latter kind of variation, which appears to be more fuzzy and casual than the phenomenological one, implies that the salient features of variation and the mode of varying depend on the various purposes. To stay with our human face example, consider some of the possible purposes of variation:

- (1) Why does this face look familiar?
- (2) What does a face lift do?
- (3) What makes a face look oriental?
- (4) What lipstick should I wear?
- (5) What is the essence of a face?

Only the last purpose of variation, properly speaking, is of concern for a phenomenologist. I think that Husserl would probably consider the purposes like 1-4 not to be purified and objectified enough in order to serve as a ground for rigorous phenomenological investigation.

In phenomenology, free variation is just one of the many possible strategies that can be used in order to display certain essential features of the process by which the human mind transforms and modifies the world of experience. The following chapter will attempt to examine this cognitive strategy, its development, its nature, and its prominence in phenomenology. I

believe that Husserl's early work, *Logical Investigations*, set the foundation for his subsequent and distinctive treatment of the notion of free variation. In particular, the *Investigations* are crucially important to any attempt of clarifying the roots of this notion in phenomenology.

It was in *Logical Investigations* where Husserl, for the first time, envisaged the importance of free variation as an activity discovering certain regularities in human experience and cognition. The index of that book, however, does not contain an entry "free variation" or similar notion. Indeed, Husserl refers to this cognitive operation only a few times, terming it "boundless" or "free" variation.

It was only much later, in his *Experience and Judgment*, and to some extent in *Formal and Transcendental Logic*, that Husserl developed his conception of "eidetic variation" as an activity leading to the discovery of essences. In this latter conception, free variation is transformed into an eidetic procedure which either involves "insight" into essences or provides the means of "seeing" essences (*Wesensschauung*). All this naturally deals with the *ideas*, image-like creatures of the mind. In sharp contrast to this, Husserl's early conception of free variation (implicitly contained in the *Investigations*) involves *conceptual* matters and the methods of conceptual analysis (the notions of ontological (in)dependence, isolability, unity, etc.).

In this chapter, I will attempt to elucidate this shift in Husserl's understanding of free variation. Finally, I will discuss what appears to be an aberration in Husserl's theory of free variation, namely some of his writings other than *Investigations* and *Experience and Judgment*, where Husserl seems greatly to widen his scope of inquiry and talk about "free fancy" instead of "free" or "eidetic" variation. I will argue that the notion of "free fancy," developed in *Ideas*, involves issues which should be kept apart from Husserl's "central" discussion of free variation and eidetic variation.

(2) Free Variation in the *Investigations*

We have seen that the roots of the discussion of free variation can be traced to Berkeley and Locke. Both stressed the importance of the idea that there necessarily exist certain limits to human imagination. Put simply, the human mind is capable of altering, in imagination, the structure of the sensory experience it receives or has received only in certain ways. We can, for example, imagine a man with three heads or a horse with two wings. Locke writes in the *Essay* (2.30.5.) about our complex ideas of substances which are made up of such collections of ideas as were really never united and never were found together in any substance. What we are not capable of imagining, however, are the ideas that are by their nature not separable and isolable. Certain parts of a presented whole can only exist as unified with other parts. Thus, it is impossible to separate movement from a moving body even in one's imagination. Berkeley pointed out the latter in illustrating the difficulties in the claim that all words stand for ideas: "The word Blue stands for a Colour without any extension or abstract from extension. But we have not an idea of Colour without extension. We cannot imagine Colour without extension" (Berkeley, *Philosophical Commentaries* 1948, 62).

These reflections illustrate the historical context for Husserl's theory of wholes and parts. He begins his Third Investigation, which is devoted to developing this theory, by discussing independent and non-independent contents. As the point of departure he takes Berkeley's polemic against Locke where Berkeley claimed that "abstract ideas" are impossible to form since it is impossible to separate the abstract idea from the actual experience. For example, it is impossible to separate whiteness from white objects. This polemic seems to lead one in two possible directions: either to the Platonic claim that there are abstract ideas, but that they are not derived from experience alone, or to the claim that the results of the process of abstraction still belong to the realm of the empirical. Both claims are difficult to defend. Husserl sought to find a middle ground between these two extremes by developing a novel theory of parts and wholes.

The branch of logic which examines the part-whole relationship is called *mereology*. In this chapter, however, I am concerned with neither formal properties of the part-whole relationship nor with any formal problems of mereology. Instead, I want to focus on the role which the part-whole relationship, and some other notions related to that relationship, played in the development of Husserl's notion of free variation.

(a) Parts and Variation

For Husserl, the investigation into regularities of cognition is not an investigation into some *psychological* phenomenon. In opposition to various forms of *psychologism*, Husserl held that the imagination reaches only far enough to reveal certain objectively existing regularities. Thus he understood the limits of imagination as representing certain objective and immutable properties of phenomena.

This is how he defines the notions of "part" and "whole" in the

Investigations:

We interpret the word 'part' in the *widest* sense: we may call anything a 'part' that can be distinguished 'in' an object, or, objectively phrased, that is 'present' in it. Everything is a part that is an object's real possession, not only in the sense of being a real thing, but also in the sense of being something really in something, that truly helps to make it up: an object in itself, considered in abstraction from all contexts to which it is tied, is likewise a part (Husserl 1970, 437).

Husserl's theory of the parts and wholes was significantly influenced by Bolzano's work on the logic of parts and wholes. This Bolzanian influence is particularly evident in Husserl's treatment of the further division of parts into parts of parts:

An intuitively unified tone-sequence, e.g. a melody, is a whole, in which we find individual tones as parts. Each of these tones has further parts, a 'moment' of quality, of intensity etc., which as part of parts are also parts of the melody. But it is clear in this case that the mediacy with which the qualitative 'moment' of the individual tone enters the whole, cannot be attributed to our subjective series of divisions or to any other subjective ground (Husserl 1970, 471).

In this example the melody is a whole, the tone is a prior part and its intensity is a later, mediate part. Earlier treatments of parts and wholes can be found in

Bolzano's *Theory of Science*. Bolzano held that ideas which are part of an idea must be somehow connected, since they form the parts of a whole. Frequently, the constituents of an idea occur in an order which is not arbitrary. If this order were changed, another complex idea would result. This is how Bolzano accounts for this taxonomy of ideas: "I claim that in a complex idea the constituents sometimes occur in a certain order and sequence; hence we may call one of the constituents the first, another the second, etc. But I do not claim that this is *always* the case (Bolzano 1972, § 58, 74). Bolzano also warns that the order of the constituents of a complex idea sometimes *is* arbitrary. This is due largely to the discursive nature of human thought, i.e. the fact that it cannot grasp various properties at once, but only one at a time.

Husserl's attention, however, was directed to the non-arbitrary arrangement of parts in a complex whole. He particularly sought to strengthen and further utilize Bolzano's "order" of the constituents of the complex idea by transferring this kind of regularity from the realm of ideas to the realm of phenomena. For example, Bolzano would typically have orders like this in mind:

(1) English speaking Frenchman

(2) French speaking Englishman

whereas Husserl's order would involve sub- and super- ordination. So, in a typical example, the primary constituent would be tones (as "proper" parts of a melody) and the secondary constituents would be intensity of these tones.

Perhaps the most significant and most controversial characteristic of Husserl's treatment of the part-whole relationship consists in his extension of this relationship not only to ideas and propositions but also to virtually all real and possible epistemic matters. This is the point where Husserl departs from Bolzano. In the *Investigations*, Husserl ranks Bolzano in close proximity to Leibniz and is full of respect for his systematic efforts in logic. However, he held that Bolzano's work lacked epistemological dimensions:

To mention only one point, one particularly feels his [Bolzano's] defects in epistemological directions. There are either no investigations, or else quite insufficient ones, which give genuine philosophical intelligibility to logical thought-achievements, and so provide a philosophical estimate of logic as a discipline (Husserl 1970, 224).

Husserl's theory of the pure forms of wholes and parts was an important part of his grandiose attempt to clarify and classify *all* knowledge. In other words, Husserl believed that certain kinds of regularity in logic and formal ontology held *a priori* and moreover encompassed some aspects of the entire structure of human understanding and experience. Here is a discussion of the perception of a pitch and a tone and the perception of a colour and a shape:

If we are right in holding that there is a part of the quality, e.g. the pitch C, of the tone in question, which represents its generic 'moment', what it has in common with all tones, then this 'moment' primarily inheres in the quality, secondarily in the tone, and at least tertiarily in the whole tone-pattern etc. Just so the moment of colour or shape that inheres in an extended part of what is visually intuited as such, is primarily attached to this part, only secondarily to the intuited whole (Husserl 1970, 471).

In Husserl's theory, it can never be an accident that a phenomenon is a part of something else, and moreover, the ways in which parts appear differ

greatly, but never accidentally. According to him, there are many kinds of necessities and, respectively, many relationships of dependence between various objects, concepts, and phenomena. However, these matters are largely regulated by *a priori* laws. In Husserl's words:

To be a part, and, more exactly, to be a part of some determinate sort (a metaphysical, physical, or logical part or whatever) is rooted in the pure generic nature of the contents in question, and is governed by laws which in our sense are *a priori* laws or 'laws of essence' (Husserl 1970, 481).

Clearly, there seem to be Kantian overtones in this sort of discussion. One should note, however, that Husserl's belief that "the laws of essence" are objective and independent of human cognition sharply discriminates the phenomenological from the Kantian understanding of the *a priori*.

That all that is given to the human mind or, in other words, any sort of content which may be subject to phenomenological examination, is necessarily governed by the "laws of essence" is one of the most fundamental claims in phenomenology. In the same vein, the latter insight is one of the starting points of phenomenology. From there, phenomenology proceeds, in large part, by discovering and explicating these laws of essence by engaging in a phenomenological description.

In disclosing the "laws of essence" the role of free variation is pivotal. When it comes to parts and moments, free variation was conceived in the *Investigations* as having a particular purpose. It was designed to serve primarily as a test of *isolability*. As Husserl put it:

Isolability means only that we can keep some content constant in idea despite boundless variation - variation that is free, though not excluded by a law rooted in the contents essence - of the contents associated with it, and, in general, given with it (Husserl 1970, 443).

One may be capable of isolating the particular idea, or parts of ideas, and keeping it constant in one's mind despite all the possible changes that may affect that idea and the ideas associated with it. Consider his favourite example, "head of the horse:"

The head of a horse can be presented 'on its own' or 'cut off', i.e. we can hold it in our fancy, while we allow the other parts of the horse, and its whole intuited setting, to alter and vanish at will (Husserl 1970, 439).

One may attach that head, in one's mind, to the rest of a human's body and form a "horse-headed" human being. In the same vein, one may imagine the horse's head carved in wood and placed on a chess board, or some other possible configuration. Some other parts of the complex ideas, such as "the hue of the colour," "intensity of the musical tone" are, however, not capable of being imagined in isolation. Hence variation shows that a head, or generally, a "thing" has a different nature from a hue or intensity.

This discovery of isolability of the parts leads to some other discoveries. If one succeeds in showing that "head" is capable of being imagined in isolation then its ideally graspable essence, its intrinsic structure, is independent from all other contents. For example, a sheet of glass would be a part independent of a whole. In contrast, if one imagines a *sales representative* as a part of the whole (certain company) then it becomes clear that being a representative *presupposes*

being a representative of the company. In this sense, a part *sales representative* is dependent on *company* as a whole. I will further examine interdependence of parts and moments in connection to Husserl's understanding of moments.

As we have seen, there are fine differences in various kinds of regularities in phenomena. Husserl introduced variation, in the *Investigations*, as the means of exhibiting these regularities that may be discovered by the acts of imagination.

(b) Moments and Abstraction

Regarding Husserl's attempt at the taxonomy of pure essences the following question - a question much in the vein of the British empiricist tradition - might be asked: "How does one make sure that the essences one is supposed to discover are not either a figment of one's imagination or simple and casual empirical generalizations extrapolated from sense data?" In order to answer this question, he introduced the notion of *moments*. This notion was expected to solve the problem of the existence of abstract properties and relations.

Here again we see that Husserl is greatly influenced by the British empiricists in the *Investigations*. This time, he is accounting for a dispute between Locke and Hume concerning the problem of abstraction and appealing to what he interprets as Hume's solution of this problem.

The question, as Husserl phrases it, is the following: "How can we distinguish between the *white sphere* we have just intuited and *whiteness* (and sphericity) since 'whiteness' and 'sphericity' cannot count as ideas in the Lockean sense?" One has to remember that, for Locke, the ideas such as "whiteness" would have to be contained in the concrete idea as particular parts separable from it.

Husserl points to Hume's solution to this problem, which is strikingly similar to Carnap's "similarity circles" mentioned earlier in the Locke chapter:

If we compare a white sphere with a black sphere and on the other hand with a white cube, we notice two differing resemblances. Through repeated comparison of this sort, objects sort themselves out for us into "circles of resemblance" and ever strengthening habits teach us to consider each object in "different aspects," according to the resemblances which permit its placing in different, but definite circles (Husserl 1970, 408).

Hume talked, according to Husserl (although I was unable to find this in Hume's writings), about "circles of resemblance." Apparently, one is able to form circles of resemblance by considering each object in different aspects. In other words, human beings discern, through habit and repeated instruction, typical resemblances which permit placing objects in different but definite circles. The result of this is our ability to imagine a white cube and bring out a resemblance (in respect of colour and shape) so that the white sphere is given a place in the resemblance circles of colour and shape. According to this reflection, it is

possible to note different "moments" in the same intuitive object. In other words, the same intuition may serve as a basis for the so-called abstraction.

Remembering Locke's process of abstracting, one might claim that Hume's process of abstracting proceeds in a different direction from Locke's. Locke's abstraction works by tacitly presupposing certain respects in which perceived or imagined objects resemble each other and only then invoking the objects. Hume's abstraction, at least according to Husserl, begins by invoking more or less complete representations of the objects in one's mind. Only then does one proceed to examine these representations and to discover the moments that they may comprise.

(c) Moments, Properties and Species

Husserl defines the notions of *piece* (portion) and *moment* (an abstract part) using the notions of relative dependence and independence:

Each Part that is independent relatively to a whole W we call a Piece (Portion), each part that is non-independent relatively to W we call a Moment (an abstract part) of this same whole W (Husserl 1970, 467).

The gist of his contrast between moments and pieces is an attempt to deny that the former are *real* in the sense in which independently existing objects are. Nevertheless, in maintaining that moments can not exist independently, he would still like to claim that they have to be accounted for as objective entities. According to Husserl, pieces are individuals which are capable of having

numerous temporal, spatial, and causal relations with each other. They can be isolated and taken separately as whole and real objects. Moments, by contrast, are separable only in imagination. The latter are capable of appearing either in the simple relations or in the most intimate mutual penetration but never in isolation. Furthermore, the same intuitive object (a piece) can be a basis on which different moment-parts are noted.

In order to prevent a great confusion that may arise by conflating objects of experience, pieces, moments, and species, Husserl attempted to clarify these things in simple terms in the *Investigations*. Suppose we have a red object before us. Clearly, this object is not the species "red." Not only is this object not the species itself, it also can not contain the species as a "psychological" or "metaphysical" part. To hold that objects contain the species in themselves would involve multiplying abstract entities beyond any reasonable need. How would one explain, to use a contemporary example, that a bank card contains the species "red" in itself, as well as "plastic," "rectangular object," etc. When it comes to moments, however, one does not have to speak of abstract entities contained in some other, real, entities. The moment (non-independent part) of "red" is something individual, something capable of existing here and now.

The moment arises and vanishes with the concrete whole object. The particular moment of colour red (for example, the particular intensity or hue of red) is alike red but not identical in different red objects. In the same vein, the

particular degree of softness or elasticity constitutes a moment of "being made of plastic."

However, this does not mean that moments should be confused with *properties* of objects. To illustrate this, consider whether "being a product of communist economy" is a moment or not. One could claim that since "being a product of communist economy" once applied to a wide range of products (cars, jackets, newspapers) it should be seen as a moment. Take, for example, the cars manufactured in communist countries during the era of the cold war. All these cars were quite unlike and they were produced by quite different countries, from China to Hungary, but there was that one property clearly recognizable in all of them. They were all made by a communist country; that was what made them comparable to each other.

What constitutes "being a product of communist economy" a property and not a moment is its dependence on human ordinary and mundane perceptions of objects which may be, and often are, subject to change. In this particular case, it can be easily imagined that people will not be able to tell, in the not too distant future, whether a particular car was indeed produced by a communist economy or not. One has to remember that phenomenologists introduced "bracketing" precisely in order to clear their descriptions from the effects of human ordinary and mundane perceptions.

In contrast to particular moments of colour "red," "redness" is an ideal unity, in regard of which it is absurd to speak of its coming into being and

passing away. The latter would be a category mistake; one could say that it makes sense to say that the red in an object has a particular intensity, or comes to be or passes away. But the same cannot be said about redness.

(d) Moments, Foundation, and Interdependence

Let me give an example in order to illustrate the concepts of moments and foundation. Imagine a tone. One can evidently vary a tone in a number of ways. It might be higher or lower, it might be louder or softer, it might be brassier or brighter. These fundamental ways of *varying* the general concept (or the mental impression) of a tone leads to a discovery of *moments*. Moment is an entity which is *founded* on some other entity. In the case of a tone, we take it to be a foundation for various possible moments that tones may have. We consequently discover that there are at least three moments to tones: pitch, loudness, and timbre.

This kind of variation, which leads to the discovery of moments, can be distinguished from another kind where we take certain parts to examine their relative independence from their respective wholes. For example, we can take the head of an animal and imagine it carved in wood or wrought in iron. Moreover, we can imagine a recognizable head of an animal in many kinds of stylized form, e.g. made of matches, ceramic tiles, or Lego bricks. Because we

can do this, we have established that the notion, i.e. of a head, examined by free variation is of independent nature, i.e. it is not "founded" in any other concepts.

However, with certain moments, such as for example "the level of exasperation in a gesture" we cannot form any independent judgment or mental image without presupposing the notions they depend on. If we discover that certain notions, such as "exasperation in a gesture" depend on some other notions - in this case on "human behaviour" - we can conclude that the former are *founded* in the latter. In cases like this one, it is even possible to reconstruct hierarchies of dependence starting from the most general and proceeding to the most specific:

- (1) human behaviour
- (2) human gesture
- (3) exasperated gesture
- (4) more or less exasperated gesture.

This may lead us to work towards disclosing, reasonably precisely and exhaustively, the intricate web of moments and parts and the relationships of dependence between the moments, parts and wholes. By looking beyond the appearances in this manner, Husserl believed, we disclose the hidden and implicit regularities in cognition.

As I suggested earlier, moments and parts, by their nature, have pregnant and essential relations of dependence with each other and with their respective

wholes. Husserl called these relations the relations of *foundation*. This is the way in which he defines foundation:

If a law of essence means that an A cannot as such exist except in a more comprehensive unity which associates it with an M, we say that an A *as such requires foundation by an M* or also that an A *as such needs to be supplemented by an M* (Husserl 1970, 463).

A "founded" concept obeys a pure law, or a law a priori, which makes the genus of the "founded" concept dependent on the genera of the "founding" contents.

Here is an example Husserl gives in *Experience and Judgment*:

We can also say: if, by varying the example, we construct the *a priori* concept "sound," we find contained in it the partial concepts "quality," "intensity," and "timbre." If we retain the concept of sound and think of some individual particulars or others of this kind in thinking "in general," it belongs in general to this concept that it also participates in the partial concept of sound (Husserl 1973, 376).

According to Husserl all these laws and regularities may be discovered with respect to most phenomena. As we will see later in this chapter, there are some modes and domains of cognition which are indeed prone to disclosing this sort of regularity - Husserl's examples with tones and colours are carefully chosen to enhance this sense of regularity and order in cognition.

However, there is a vast number of phenomena and moments whose interdependence is by no means an *a priori* matter (for example, "being made of plastic" as a moment). Moments of this kind would, most probably, have to do with the contingent and typified understanding of certain historical, political, artistic, or any other kind of potential aspects and properties of phenomena.

Perhaps one would have to admit that there are some phenomena which allow for rigid conceptual hierarchy and some which do not. Consequently, a hierarchy of both conceptual and intuitive matters would largely apply to the former kind of phenomena. To see how this sort of hierarchy works, one has to remember that the "particular triangular figure" is a species of "triangular figure" which, in turn, is a species of "spatial figure." However, these relations of foundation are not to be continued indefinitely - if they were, Husserl would be faced with the charge of infinite regress. One is reminded of an ancient philosophical fable about the way the Earth is supported by turtles which rest on turtles which rest on turtles, and so on. This is Husserl's account of how he managed to escape infinite regress:

Our conception avoids these endless regresses of parts which are always splitting into further series. Nothing *really* exists - in the sense of being a possible object of sense-perception - beyond the aggregate of a whole's `pieces', together with the sensuous forms of unity, which rest on these pieces conjointly. Unity is conferred on the `moments' in the `pieces', as also on the `moments' of unity *and* the `pieces', by the foundational relations in the sense of our definition (Husserl 1970, 479).

(e) Aggregates and Levels of Dependence

By introducing moments, Husserl's theory can be seen to be closely connected to the application of free variation. First their affinity is evident in a methodological sense. Free variation is by far the most effective means of revealing moments and parts and their mutual relationships. Second, the

notions of free variation and moment have a functional affinity. The functional affinity between free variation and moments is shown most effectively by focusing our attention on "aggregate" as a form of unity of thought.

Thoughts may occur together and yet not form any new content, or significant new whole. In such a case we speak of an aggregate. For example, one may imagine in one moment two apples on the table and in the next moment three pears on the same table. In that case, thought would unite "pieces" and not "moments." This mode of variation would reveal no salient properties and no relationships of dependence regarding any of its objects and ideas. In an aggregate, there are no essential features to be discovered by varying any of its contents:

This is shown in the fact that the form of the aggregate is quite indifferent to its matter, i.e. it can persist in spite of wholly arbitrary variations in its comprised contents (Husserl 1970, 480).

The difference between the entirely arbitrary variation in an aggregate and "free" variation, which may be used for the purposes of phenomenological inquiry is fruitfully illustrated, I believe, by a mathematical analogy.

In the practice of elementary algebra there are two treatments of a free variable, illustrated by the difference between so-called *conditional* and *identical* equations. An example of the latter is: $x+y = y+x$ and the example of the former is $x^2+2x-8 = 0$. Truths about the variable x in the identical equation are generated differently from truths about the conditional equation. For the purposes of this analogy it might also be noted that, in the identical equation,

one is free to substitute any number for x , without affecting truth or falsity of the equation. In other words, the activity of varying x does not reveal any dependence of the variable x on the form of the equation. In the case of conditional equations, only the substitution of certain numbers will yield true results. Hence in the latter case, substitution seems capable of revealing that x is dependent on the form of the equation.

Even in the case of wholes, which unite their constituents in forming a new concept, it is possible to discern various levels of interdependence of their moments. On the one hand, moments such as visual quality and extension may be varied independently. Husserl remarks that to say, for example, that certain constituents of the complex ideas cannot be *imagined* in isolation is not to say that those (interdependent) constituents cannot be *varied* independently. He considers moments of *visual quality* and *extension* and their relation to the *figure* which bounds (founds) them:

It is doubtless true in a certain sense that these moments can be *independently* varied. Extension can stay the same while colour varies indefinitely, colour stay the same while extent and figure vary indefinitely (Husserl 1970, 440).

This capacity of "varying the moments indefinitely" is limited by the assumption that extension and visual quality are still there - they cannot simply be eliminated.

On the other hand, there are much stronger relationships of interdependence where varying one of the moments necessarily affects another.

An example of this kind of dependence would be the relation of intensity to quality. In Husserl's words:

The Intensity of a tone is not something indifferent or so-to-speak alien to its quality. We cannot keep the intensity just as it is, while the quality varies at will, or is allowed to vanish (Husserl 1970, 441).

In other words, if one increases the brightness above a certain point, one necessarily diminishes the saturation of a colour. The very bright, "washed out," colours cannot be rich in pigment.

(f) Conclusion

The task of phenomenology is to capture the essence of these moment-parts and their mutual relationships, by describing their nature. The essence of these entities was supposed to emerge, according to Husserl, through the intricate, yet rigid, web of relationships of dependence and unity. However, the most effective way to isolate and to examine the properties of moments and forms of their unity is by the means of "boundless" or "free" variation. This was the term which Husserl used in the *Investigations* on a very few occasions.

Since moments and moment-parts are not *real* entities, they are, by their nature, not the objects of *observation* or *empirical testing procedures*. In order to examine and to capture their properties one has to set up *in one's mind* the "laboratory" in which to perform the investigation. Once that decision is made in principle, the grounds for the use of free variation are ready. The

investigators need only set up in their mind the particular fraction of the world on whose basis diverse properties and relations are to be varied.

As I have suggested, free variation in phenomenology emerged as a part of Husserl's attempt to address both the problems of epistemology and logic in his *Logical Investigations*. Husserl held that there must be certain regularities of thought and experience which may be discovered and described by a rigorous philosophical inquiry. Through the practice of this inquiry, it turns out that one cognitive strategy proved to be particularly effective in phenomenology, the strategy called "boundless" or "free" variation.

What I would like to suggest, and will discuss later, is that the study of free variation can and should be extended beyond phenomenology. This particular phenomenological notion captures, I believe, a precise and elaborate cognitive mechanism.

In fact, I would suggest in closing that free variation is directly applicable to several contemporary questions. Free variation may find its application in the contemporary debates on thought experiments and nature of imagination.

In terms of cognitive science, the dynamic and complex initial gestalt which is formed by the process of free variation may also help us gain some insight into the ways in which the "Laboratory of the Mind" works.

Finally, free variation may help elucidate the intricate processes of transformation between the pictorial and the discursive in human cognition,

transformation which occurs, in some form or another, whenever the human mind engages in manipulating its thoughts and images.

(3) Development and Refinement of Free Variation in *Experience and Judgment*

a) Introduction

As I have attempted to show, *Logical Investigations* provided the foundations for subsequent development of free variation in phenomenology. I hope that I have revealed Husserl's great indebtedness to the British empiricist tradition on the topic of manipulating ideas in one's mind. Locke's manipulation of ideas in human cognition, in particular, served as the ground for Husserl's treatment of varying contents of one's thought.

Manipulation of ideas, however, may be placed in contexts other than that of the *Investigations*, where Husserl took it only as an important element in examining parts and wholes and their mutual dependence. In his later work *Experience and Judgment*, he attempted to show that the manipulation of ideas, in the form of free variation, can be examined on its own. One has to note, however, that the *Investigations* and *Experience and Judgment* have a lot in common. For one thing, they both exemplify Husserl's broad and peculiar understanding of logic. In particular, parts of *Experience and Judgment* were written in an attempt to solve some particular problems that arose in the *Investigations*. Some older parts of *Experience and Judgment* date from 1908. They were combined, by Ludwig Landgrebe (who edited this book), with some

other manuscripts dating from 1910 to 1914 and some later material.

Experience and Judgment was published quite late -- a short time after Husserl's death in 1938, by Academia-Verlag of Prague.

The technique of variation was conceived, in *Experience and Judgment*, as the vehicle of essential seeing. However, in order to reach an understanding of both free variation and essential seeing one first has, I believe, to consider the role of two methods of generalizing in Husserl.

According to Husserl, who relies in these matters on a deeply rooted philosophical tradition, there are two fundamental methods of generalizing: *empirical* (non-essential) generalization and *pure* (essential) generalization.

Empirical generalization, by its nature, creates non-essential types. In the experiences of everyday life, this typification is quite stable and capable of reliable judgments and predictions, but it may sometimes be erroneous and superficial. Husserl illustrates the latter by an example from zoology: The membership of whales in the class of mammals is masked by the outward analogy which whales have with fishes.

Nevertheless, empirical typification is a basis for the natural sciences and for what Husserl calls "empirical natural history." Suzanne K. Langer, in her *Mind: An Essay on Human Feeling, Volume I*, devotes a chapter to pre-scientific knowledge. Her illustrations of the ways in which a pre-scientific typification proceeds are exceptionally perceptive. Here is one of her examples:

Ordinarily in the kind of thinking which civilized adults today call "common sense," every familiar physical object has a stable dominant gestalt according to which it is publicly classified, i.e., named; and how it is named largely determines the way we experience it even privately. One may fancy a witch riding on a broom, but one thinks of the object she rides on as a broom; it would be strange to think of sweeping the kitchen with the bristly tail of a witch's hobbyhorse (Langer 1967, 61).

In Husserl's writings, there are numerous treatments of the acquisition of empirical concepts. Husserl has often emphasized the role of typification in empirical generalization:

When we see a dog, we immediately anticipate its additional modes of behaviour: its typical way of eating, playing, running, jumping, and so on. We do not actually see its teeth; but although we have never yet seen this dog, we know in advance how its teeth will look - not in their individual determination but according to type, inasmuch as we have already had previous and frequent experience of "similar" animals, of "dogs," that they have such things as "teeth" and of this typical kind (Husserl 1973, 331).

It may appear that this sort of generalizing is subject to random and contingent influx of experiences that, over time, take the shape according to various "external" and "internal" circumstances. The internal circumstances might be: frequency and regularity of certain experiences, history of the early and primitive attempts at generalizing, etc. The external circumstances might be: social and cultural stereotypes and routines, idiosyncrasies adherent to particular languages, etc. These generalities, which I can only touch upon, have been studied by more or less empirical scientific disciplines such as anthropology, psychology, sociology, and linguistics.

Husserl's concerns, however, took a somewhat different direction. He was interested in pure laws and regularities in cognition which should be seen as

distinct from the empirical typification. One of their most important points of difference is that pure laws of typification can always engulf empirical ones. To see how this works, it is sufficient to direct one's attention to certain processes of thinking.

Any concrete individual, for example, is capable of being thought of, or imagined, repeatedly. In that case, the individual would become an example of its sort, capable of being thought of *independently*. This property makes this individual a concept of the lowest generality, therefore the most independent concept:

This universal, born of the repetition of like independent objects (that is, from individuals) is lowest generality, the most independent; that implies that it is one which is not founded in other generalities, therefore which does not presuppose them (Husserl 1973, 335).

In Husserl's terminology, this indicates that this concept is not founded on any other concepts or generalities. In opposition to this, there are numerous concepts which by their nature presuppose some other, more general, concepts. For example, the concept "debt" presupposes at least some of the following concepts: "value," "goods," "money," "private ownership," etc. Generality can be extended; Husserl offered, in *Experience and Judgment*, the following examples of the most general concepts: "unity," "plurality," "whole," "part," "difference," etc.

He explained that the difference between "higher and lower order" generalities emerges largely as an effect of varying ideas in one's mind: "The

higher generalities are obtained by variation of ideas (Husserl 1973, 359)."

What he meant by this is that ideas do not simply *display* their level of generality: something has to be done to them in order to discover their conceptual "provenance." Since all ideas depend, at least to some degree, on sensory experience, even the ideas of highest generality cannot be entirely divorced from the world of experience. Indeed, Husserl stated that "the seeing of ideas is itself an analogue of simple experience" (*Experience and Judgment*, 359). However, the seeing of ideas is a *higher* and *actively productive* form of consciousness in which the mind becomes capable of grasping a new kind of objectivity, the *universal* objectivity. Inquiry into this sort of phenomenon and this mode of cognition falls, according to Husserl, into the realm of pure, a priori, forms of cognition.

The empirical and the pure generalizing may also be seen as constituting two distinct, although interrelated, methodological approaches. The first is the approach of empirical science which routinely refines and redefines most of the aspects of the empirical typification. Science normally takes common sense and direct perception as the loose check points for its theories. Science, in this sense, creates *models* for embracing and explaining phenomena in the most satisfactory manner. The second approach, mostly but not necessarily associated with philosophy and logic, is concerned with the pure laws which govern all possible typifications and generalizations. This second approach, in phenomenology, proceeds by seizing upon essences. The method this approach has been using is

called, in Husserl's terminology, the method of essential seeing

(*Wesenerschauung*). He does not define the method of essential seeing *per se*.

Instead, he notes the following about this method's execution:

It is based on the modification of an experienced or imagined objectivity, turning it into an arbitrary example which, at the same time, receives the character of a guiding "model," a point of departure for the production of an infinitely open multiplicity of variants (Husserl 1973, 340).

It is clear that the most effective vehicle of essential seeing in phenomenology is the activity of free variation.

(b) Basic Features of Free Variation in *Experience and Judgment*

As pointed out in the earlier part of this chapter, I believe that Husserl's notion of free variation has its roots in *Logical Investigations*. Through the course of Husserl's practice of phenomenology, however, the notion of free variation has become augmented and, in *Ideas*, conflated with that of free fantasy. I will attempt to show that there are notable differences between these two which are exhibited, most evidently, by the range of their application. As well, I believe that *Experience and Judgment* further develops the analysis of the fundamental characteristics of free variation which were only hinted at in *Logical Investigations*.

In *Experience and Judgment* one can find, for the first time fully and coherently elaborated, the doctrine of free variation. I will now examine its most salient features:

- (1) Free variation is produced by an act of volition. It does not occur spontaneously in the manner in which pain, perception of objects, or a sudden flash of remembrance might occur.
- (2) Free variation produces ever new similar images as copies and similar concepts as modifications of that which appears to be ideally common to all of them.
- (3) We have to retain a grasp of the things imagined earlier as a multiplicity in an open process.
- (4) Free variation discovers *essences*, the necessarily invariable, which prescribes limits to all variation or, in other words, the essence without which the object or the idea cannot be imagined as such.
- (5) Free variation, in its course, reveals the open possibility of any number of new multiplicities of variation - that is why free variation gives its chosen objects a character of *arbitrariness*.

(1) The first feature of free variation, that of volition, is the feature which constitutes free variation as an *activity*. Volition implies at least some sense of

active intervening in the contents of one's thought. In other words, one has to be attentive and constantly focused while engaged in the process of free variation.

This feature of free variation makes clearer a subtle difference between free variation and freedom of fantasy. Free fantasy is a *capacity*, whereas free variation is an *activity*. For one thing, it is possible to define variation as an activity performed in fantasy. To say that the reverse may be the case, i.e. that one can define fantasy as an activity performed in variation does not make sense. Consequently, I claim that free variation presupposes free fantasy (or freedom in fantasy) but free variation is neither identical with free fantasy nor can it be entirely reduced to it.

An analogous case is made by Roy Sorensen in his book *Thought Experiments*. Sorensen draws a distinction between imagination and a thought experiment, defining a thought experiment as an activity and imagination as capacity. Sorensen's distinction pertains to a difference between an act of setting up a thought experiment in imagination (imagining it) and performing a thought experiment (in imagination). *Imagining* a thought experiment is a necessary, but not a sufficient condition for *performing* a thought experiment. In Sorensen's words:

Another sign of the distinction between the thought experiment and the imaginary experiment it depicts is the contrast between the variables manipulated in each experiment. It is one thing to imagine physical things being manipulated and another to vary what one supposes. The varied suppositions are real, the varied physical conditions imaginary. Epistemologists suppose that a thirtieth-century delusionologist is

experimenting on your brain. This imagined experiment is *part of* thought experiment, not the thought experiment itself (Sorensen 1992, 221).

(2) The second feature of free variation involves producing ever new images of that which is ideally common to all of them. When it comes to this sort of activity, one is reminded of Locke's views on variation and abstraction. In Locke, there was always a sense of mutual dependence between concrete ideas being modified and the general idea which serves as the ground for modifications. This sort of dependence was often a ground for criticisms launched against Locke. One has to remember that Locke always presupposed some sense of generality which was already installed in the human mind alongside received sense experience. This "built-in" generality then served as the *respect* in accordance to which ideas should have their parts modified. But in Husserl it is the other way around: one attains this sense of generality through the very process of modification of ideas.

Husserl was not worried by this apparent circularity; he always emphasized one's freedom to engage in the process of variation at any level. To use his example, one could either start by varying concrete objects in order to discover a higher generality, namely a particular colour. Thus one could say that any number of given objects are variants of "red object." At the same time, one could choose to initiate the process of variation leading to the highest abstract genus - to an *abstract essence* - one would vary several coloured objects and discover that colour belongs to all of them as a highly abstract moment. In

other words, one would discover that colour is not an independent, real object; it presupposes extension in order to exist. For Husserl, Lockean dependencies between general concepts and their variants merely serve as a vast playground, or network of possible directions, for free variation. He gladly embraced all possible meanderings that the process of varying may take:

But in the case of variation, we can start out *from the beginning from a concrete, independent object*. Thus, for example, by the variation of this fountain pen we come to the genus "useful object." But we can also drop this limitation and discover ever new possibilities of variation; we can, for example, imagine the fountain pen changed into a stone, and there is still something common which runs through them: both are spatially extended, material things (Husserl 1973, 358-359).

(3) The third feature of free variation is our capacity of retaining in grasp the things imagined earlier. This is obvious: without some sort of common thread, the modifications of ideas and images would turn into mere temporal juxtaposition of ideas. This feature of free variation also provides it with a sense of *direction*:

...we must, despite the arbitrary nature of the activity of variation in other respects, confine ourselves to *one* direction: if at the beginning of the variation a common red lights up for us, we can then immediately arrest it and intend nothing other than red in general, therefore that identical red which any additional variation whatsoever would give us. If we are confronted with a green, we reject it as not belonging to this series of variations, as entering into conflict with the seen red which continues to be intended (Husserl 1973, 357).

This example shows "incongruent" variants being eliminated from the "normal," or intended, course of free variation.

(4) The fourth feature of free variation is its capability of discovering essences. In her study of Husserl's logic, Suzanne Bachelard remarked that "Phenomenology employs only the data of pure intuition" (Bachelard 1968, 182). However, phenomenology is also engaged in eidetic analysis, by virtue of which it strives to be both an intuitive and a priori discipline. How does this a priori dimension come about? Phenomenology, according to Bachelard, does not *explain* the nature of the human being through theories. It uncovers, instead, the profound sense of the world and of the human being. This is how Bachelard puts it:

But this uncovering makes essences appear which reveal *a priori* structures. And these a priori structures are revealed not only in the objective world but even in the constituting subjectivity (Bachelard 1968, 184).

Bachelard's passage, dealing with a priori structures and the constituting subjectivity, looks like an inverted Kantian position. A Kantian would surely have things this way round: A priori structures are revealed not only in the constituting subjectivity but even in the objective world.

In *Experience and Judgment*, as well as in *Ideas* there are numerous passages which suggest that all empirical experience is formed according to certain a priori and necessary principles:

It will be necessary to show how, in contrast to these empirical concepts, pure concepts are formed, concepts whose constitution does not depend on the contingency of the element actually given as the point of departure and its empirical horizons. These concepts do not envelop an extension which, as it were, is open merely *after the event*, but beforehand, *a priori*.

This envelopment beforehand signifies that they must be capable of *prescribing rules to all empirical particulars* (Husserl 1973, 339-340).

The nature of these rules and regularities of all empirical particulars is such that they are best discovered and isolated by the activity of free variation. Husserl was attempting to show how it happens that the particular necessities in all experience and the conditions of conceiving certain objects and concepts in imagination are brought out by free variation:

In other words, for its modification in pure imagination, we let ourselves be guided by the fact taken as a model. For this it is necessary that ever new similar images be obtained as copies, as images of the imagination, which are all concretely similar to the original image. Thus, by an act of volition we produce free variants, each of which, just like the total process of variation itself, occurs in the subjective mode of the "arbitrary." It then becomes evident that a unity runs through this multiplicity of successive figures, that in such free variations of an original image, e.g., of a thing, an *invariant* is necessarily retained as the *necessary general form*, without which an object such as this thing, as an example of its kind, would not be thinkable at all (Husserl 1973, 340-341).

This necessary general form is also an invariable according to which all the variants coincide: it is a *general essence*. Husserl admits that this *eidōs* is to be taken as an *idea* in the Platonic sense. However, he warns against the metaphysical interpretations of this notion and suggests that *eidōs* should be taken as it is given to us immediately and intuitively in the vision of the idea which arises in the process of free variation. Husserl also admits that the term "seeing" cannot be avoided in these matters. Of course, when he talks about "seeing," he does not mean "sensuous seeing":

With this, we wish to indicate that we appropriate, *directly and as itself*, a common and general moment of as many examples as desired, seen one by

one, in a manner wholly analogous to the way in which we appropriate an individual particular in sensuous perception; although, to be sure the seeing is more complex here. It is a seeing resulting from the actively comparative overlapping of congruence (Husserl 1973, 348).

Remembering Husserl's treatment of parts and wholes and abstract entities in the *Investigations* and comparing it to passages like this from *Experience and Judgment*, one begins to notice significant, if not radical differences in methodology. Husserl's early analysis of free variation is largely a conceptual matter whereas his *eidetic* analysis of free variation in *Experience and Judgment* is largely image-based. Is there a possibility for free variation to embrace both eidetic as well as conceptual analysis? We will see, latter in this chapter, that free variation yields both kinds of analysis. Husserl's commentators indeed took both directions: Schütz talked for the most part about eidetic nature of free variation whereas Mohanty emphasized the role of semantics.

(5) The fifth feature of free variation is its open-ended nature, the possibility of extending the multiplicity of successive modifications *ad infinitum*. This feature of free variation gives the character of *arbitrariness* to its chosen objects and ideas. Most commentators have devoted considerable effort to elucidating the importance of this feature. Richard Zaner summarizes the basic points about this, made earlier in Bachelard's book, in the following way:

Closely following Husserl's works, Bachelard stressed that this *Beliebigkeit* signifies (1) a consciousness that one is able freely to substitute one example for another, or that any actual or possible example

can serve as the point of departure, (2) that eidetic fantasy variation is a "freeing from" all factuality and (3) that the method does *not* oblige one to run through all possible cases in order for the invariant (the *eidōs*) to be made to "stand out" as such (due to the essentially appertaining consciousness of the "and so forth according to option" which Husserl stresses), this consciousness of "potency" being intrinsic to the method (Zaner 1973, 203).

This last mentioned consequence of arbitrariness might lead one to believe that the activity of free variation could be seen as nothing but a weakened form of mathematical induction. Mathematical induction is usually described in the following way:

The form of proof mentioned in the last paragraph is known as *proof by mathematical induction*. Its two stages are known as *Basis* and the *Induction Step*. In the *Basis* of a proof by mathematical induction we establish that the Theorem (whatever it is) holds for the minimal case (in the present proof, the case where the derivation is one formula long: there cannot be a more minimal case than this; a derivation has to be at least one formula long). In the *Induction Step* we prove that *if* the Theorem holds for all cases up to an arbitrarily given point *then* it holds also for all cases at the next higher point (Hunter 1971, 85).

Free variation may be seen as analogous to this; a *basis* for free variation might be an original conceptual setting, or an original idea together with an initial alternation (or modification) of this idea. The *Induction step* would further involve any number of arbitrary modifications made in the manner corresponding to the initial modification.

However, both Husserl and Husserl's commentators reject the suggestion that this feature of free variation is entirely a mathematical notion which has been simply extended, and even perhaps significantly weakened by being so

extended, to cover much wider empirical grounds. Husserl did not believe that a priori thinking is an exclusive property of mathematical reasoning:

There is not the slightest reason to consider the methodological structure of *a priori* thinking, as we have exhibited it in its general essential features in mathematical thinking, as an exclusive property of the mathematical sphere. Indeed in view of the general essential relationship of actuality and possibility, of experience and pure imagination, even to admit such a limitation would be completely absurd (Husserl 1973, 353).

In this view, mathematics is only a part of phenomenological reasoning, explicated in terms of pure generalizations, pure laws, and pure essences. It is still an open question whether or not phenomenological reasoning, without the benefit of the mathematical axiomatization, can claim mathematical rigour.

(4) Enter Fantasy: Free Variation in *Ideas*

(a) The Phenomenologist's Attitude

I have claimed that Husserl's conception of free variation as "free fancy" was an aberration from his "normal" discussion of free variation elsewhere. I will now attempt to elucidate what I perceive as the underlying motives for Husserl's uncritical "opening" of the concept of free variation. In short, I believe that it was largely the vast scope of the phenomenological project and its ontological commitments that made Husserl talk about free fancy instead of free variation in his *Ideas*.

From what I said about free variation so far it is still difficult to distinguish peculiarities of its nature and its execution from some other similar

cognitive operations. Let me begin this section by presenting the main reason why it happens that free variation is such a difficult term to make operational.

It seems that there is nothing distinctive about either the nature of its objects or the nature of its cognitive procedures. This goes hand in hand with the fact that phenomenologists never inquired into what free variation *is*. The reason for this apparent neglect in making this term operational is that free variation in phenomenology has largely been based on a particular *attitude* of an examiner, far more than on any concrete and testable, procedure.

The fundamental requirement for engaging in free variation is a shift in a thinker's *attitude*. This shift is minute and subtle and often misunderstood. For that reason phenomenologists have often dwelled on both its subtlety and its importance. The attitude which a phenomenologist assumes is primarily one of disregarding or bracketing any question about the reality and non-reality of the world. A phenomenologist is aware that an acceptance of a seemingly innocuous real/non-real distinction requires a complex nexus of acts *positing* reality, whereas it is one of the most fundamental phenomenological principles not to posit any entities before a careful investigation of them as pure phenomena.

Alfred Schütz described this shift in the following way:

Taking an empirical fact as our point of departure, we transpose the factual experiences to the realm of irrealities, of the 'as if', which confronts us with the *pure* possibilities, purified, that is, of everything bound to the particular fact and any fact at all (Schütz 1959, 160).

The phenomenological method leaves thus the objects of experience be what they may be; instead, it focuses its attention on the way these objects became what they appear to be through numerous acts of acquiring and constituting objects of experience. The attention of a phenomenologist is therefore shifted from the objects of experience to the modes of their constitution in cognition. It goes without saying that this strategy of a phenomenologist has a great lineage in the thought of Hume and Kant, among others. If one reflects on the nature of images, for example, then it would be wrong, Husserl maintains, to consider them simply present in the human mind conceived as a *camera obscura*:

One should not talk and think as if an image stood in the same relation to consciousness as a statue does to a room in which it is set up, or as if the least light could be shed on the matter by inventing a hotch-potch of two objects. One must rise to the fundamental insight that one can only achieve the understanding one wants through a phenomenological analysis of the essences of the acts concerned, which are acts of the 'imagination' in the wide, traditional sense of Kant and Hume (Husserl 1970, 595).

This procedure of shifting one's attention from the objects of knowledge to the activity of the mind is elaborated, quite often, in general commentaries on phenomenology: "We do not, for example, will to entertain an object of knowledge. Yet the mind is active in the sense that it both relates the content to itself and relates it as a certain kind of something" (Charles J. Dougherty 1980, 309).

This, broadly speaking, "constructivist" approach to the phenomenological treatment of epistemological and logical problems, has resulted in a shift of emphasis: free variation is now viewed as a particular capacity rather than a particular cognitive strategy. I will now attempt to elucidate and discuss this change of course in Husserl's *Ideas*.

(b) Free Fantasy and Free Variation

Most Husserl scholars, when writing about free variation, focus strongly on one paragraph in *Ideas*. That is paragraph 70, entitled *The Role of Perception in the Method of Eidetic Clarification. The Primacy of Free Fantasy*. This paragraph examines some features of the phenomenological method followed in seizing upon essences. Husserl first contrasts fantasy, as a kind of presentation, with perception in general. He recognizes that the external perception, when not obscured or distorted, is endowed with perfect clarity with respect to all the objective moments actually given in it. Presentations, however, and free fantasies in particular have a special role. Husserl suggests that phenomenologists should value free fantasies over the external perception.

Later in this chapter I will discuss Husserl's attempt to illustrate the latter by invoking a "pure" geometer, i.e. the one who dispenses with algebraic methods, and a sense of freedom which this geometer enjoys in fantasy. It is possible for the "pure" geometer to work by reshaping the figures at will and

running through continuously modified shapings. In a very fundamental sense, the geometrical sketches and models are secondary to this fantasy-construction and eidetic pure thinking.

Husserl further extends this sense of primacy which free fantasy enjoys in "pure" geometry to any eidetic phenomenological formations. A phenomenologist, in a manner similar to the geometer's, works with the numerous types of modifications of presentation in perception, memory, etc. The freedom of eidetic research, as Husserl says emphatically, demands from a phenomenologist that he operate in fantasy.

What most commentators of this paragraph seem not to have noticed is that it is not at all concerned specifically with *free variation* but with *free fantasy*. I will attempt to show that this difference is not one of terminology, but of content. Since the differences between these two terms seem to be rather subtle I will, first, point out some of the characteristics of free variation and, second, elaborate the nature and the conceptual background of the notion of free fantasy.

Free variation, understood in the way it was presented in the *Investigations and Experience and Judgment*, has the following basic characteristics:

- It is aimed at seizing upon essences or discovering regularities in cognition.
- It discovers essences by discovering the invariant structure in the phenomena that undergo the process of variation.

- It isolates a part of a certain complex idea which has to have the capability of being isolated in imagination (and which is therefore of independent nature).

Only the first of these basic concepts is explicitly found in paragraph 70 of *Ideas*.

What Husserl seems to be saying in this book, and particularly in this paragraph, takes, instead, the form of much more abstract and general deliberations. These deliberations concern largely the nature of the particular modes of cognition which should be seen as the grounds of creativity, problem solving, and the powers of imagination.

If this paragraph were about free variation then one would have at least two difficulties maintaining that Husserl still referred to free variation while introducing the notion of free fantasy in the *Ideas*. First, if free fantasy were free variation, Husserl would also have to grant "primacy" to free variation. This, however, would be quite incompatible with Husserl's understanding of free variation. As I have pointed out, this cognitive operation has been designed by Husserl primarily as a *vehicle* for either discovery of essences or analysis of relative independence of concepts. In Husserl's treatment of free variation *per se*, there is no indication of its supposed "primacy" over some other cognitive activities like perceiving, imaging, etc.

Second, would it be correct to say that phenomenologists "fantasize" when they vary images and ideas in their mind? I think that this question should be answered in the negative. The correct answer would be to say that

phenomenologists vary their images and ideas *in* the freedom of their fantasy. In other words, the capacity to freely vary one's images and ideas in fantasy is, and should be seen as, fundamental to any phenomenological project. This way of looking at free fantasy should also help clarify the question of primacy of free variation. One's *ability* to freely vary images and ideas in fantasy can indeed be seen as a precondition for experiencing and understanding phenomena. One's *activity* of varying ideas and images, however, is not a precondition for anything; rather it clarifies and helps understand certain features of cognition.

Husserl's use of the term "fantasy" in the *Ideas* reinforces this interpretation. For example, Husserl states that "the freedom of eidetic research also necessarily demands operating *in fantasy*" (Husserl 1982, 159, italics mine). From this it is clear that Husserl understands fantasy as primarily a necessary condition for eidetic research. Passages like the following suggest that free variation, or some other related cognitive activities (such as reshaping), occurs most importantly *in* free fantasy:

While on the other hand (and, again, as in geometry which not without reason has recently attached great value to collections of models and the like), naturally, it is necessary to exercise one's fantasy abundantly in the required activity of perfect clarifications and in the free-reshaping of fantasy-data, it is also necessary, before doing that, to fertilize one's fantasy in originary intuitions which are as abundant and as excellent as possible: whereby this is not to say that experience as experience has here a function in grounding validity (Husserl 1982, 159-160).

Husserl talks about reshaping of fantasy-data as well as fertilizing one's fantasy in experience. Further endeavours in enriching one's free fantasy, as

developed in this chapter of *Ideas*, would involve insight into history, art, poetry, and artistic means of presentation in general. Note the broadening of the scope of Husserl's terminology, especially when we contrast the latter understanding of fantasy with free variation as a particular cognitive operation.

(c) Free Fantasy and Neutrality Modification

In order better to understand the role of free fantasy in Husserl's phenomenology one has to consider, I believe, the role of neutrality modification in *Ideas*. This book introduced the notion that there is the *reproductive modification* in consciousness, or the act of presentation in general. In this sense, presentation simply modifies some earlier, and original, contents of perception by reproducing them more or less completely and vividly. This sort of modification is normally called *memory* in psychology and phenomenology. In contrast to this sort of presentation, there are some other important modes of presentation. One of them is termed *pictorializing modification*, which Husserl illustrated in an analogy with landscape painting.

One can have the landscape "in" the painted picture as an object of perception. One can subsequently produce the reproductive modification of that whole painting, by remembering seeing the painting. Or one can just imagine looking at the painting. Note that these modifications may or may not be of the reproductive sort. Even if one held that they were reproductive, one would still

need some clarification. The most important feature of pictorializing modification, as opposed to reproductive modification, is that the former is not directly dependent on perception. In other words, if one imagines looking at the painting or just remembers seeing the painting then in both cases one does not have the "mere" perception of the "real" surface of that painting, i.e. the original blots of the paint, mounted on the wall.

Numerous misunderstandings of the status and the nature of the objects "in" the painting are possible, especially if these objects are generated by one's memory or imagination. However, most muddles about the reality and non-reality of the objects of perception and memory, Husserl believed, were created by the empiricist tradition. The proponents of the empiricist tradition held that the acts of direct and immediate perception should be allotted absolute epistemic primacy, and that all modes of cognition should be, at least in principle, reducible to them. However, with pictorializing modification, for example, there is never such a thing as "the acts of direct and immediate perception." Its original mode of presentation, in the case of the painting, is essentially rooted in creating the artistic illusion, e.g. the illusion of virtual space.

In order to avoid further complications with the status or the nature of the objects of pictorializing modification (which is one of the most important modifications, but not the only possible, in human cognition) Husserl introduced a manner of modification of the utmost importance in phenomenology - *neutrality modification*.

Neutrality modification takes its objects as "merely thought of" or as "mere thoughts" and not as something actual. Neutralized consciousness does not get involved in making presumptions about the matters of existence and non-existence. Additionally, neutralized consciousness abstains from taking things as "really" possible or probable. In Husserl's words:

Neutralized positings are essentially differentiated, however, by the fact that *their correlates do not contain anything possible, anything actually predictable*; in no respect does neutralized consciousness play the role of "believing" for what is intended to (Husserl 1982, 259).

To take an interesting example, consider a phenomenon of a "talking" computer. A computer may be programmed to generate either strings of words or complete sentences, using pre-recorded phonemes as the elementary sound patterns. One might ask whether or not one is hearing "someone" speak when listening to such computer. Of course, one would have to answer in negative to this question. The simplest way to reach this answer involves assuming the act of neutrality modification of some sort. In simple words, one knows that a computer generated voice would does not really "belong" to anyone in particular. For one thing, this voice might be produced as a mixture of particular accents and other voice qualities. This "disembodied" voice is best seen as a product of neutrality modification -- one simply ignores the question whether this computer generated voice "exists" on its own.

(d) Modes of Presentation and the Art of Free Fantasy

In paragraph 70 of *Ideas*, Husserl contrasted fantasy, as a fundamental mode of presentation, with perception, as the primary source of presentation. First, Husserl acknowledges that the external, empirical, perception has, in normal circumstances, the attributes of clarity and immediacy and should therefore serve as a foundation for all phenomenological eidetic findings.

However, Husserl claims that:

There are reasons by virtue of which in phenomenology, as in all other eidetic sciences, presentations and, more precisely, *free fantasies* acquire a position of primacy over perceptions and do so even in the phenomenology of perception itself, excluding, to be sure, the phenomenology of the Data of sensation (Husserl 1982, 158-159).

To illustrate this, Husserl uses an example of the geometer engaged in "investigative thinking." Husserl's point is, roughly, this: In order to solve a particular problem, the geometer does not work with the particular shapes on the paper or on the blackboard. Neither does the geometer work with the particular shapes in reality, nor does he need to work with any actual shapes in principle. These actual shapes are drawn, generally, *after* the problem has been solved. In fantasy, the geometer has the freedom to shape and re-shape the figures in many possible ways. This freedom of shaping and re-shaping of the data in any mode of presentation (memory, imagination) is a necessary condition for conducting any sort of eidetic research.

Husserl insists that phenomenologists should be aware of this freedom and exercise, as it were, the powers of their fantasy. There are many domains of human thought, according to Husserl, which phenomenologists can investigate.

Gathering these new and enriched forms and patterns of thought helps them in grounding the validity of their judgments. But it also can help them "fertilize their fantasy." In Husserl's words:

Extraordinary profit can be drawn from the offerings in history, in even more abundant measure from those of art, and especially from poetry, which are, to be sure, imaginary but which, in the originality of their inventions of forms, the abundance of their single features and the unbrokenness of their motivation, tower high above the products of our own fantasy and, in addition, when they are apprehended understandingly, become converted into perfectly clear fantasies with particular ease owing to the suggestive power exerted by artistic means of presentation (Husserl 1982, 160).

This section ends with the well-known and very often quoted passage, which claims that "feigning," or fiction, constitutes the vital element of phenomenology by forming the source from which springs the cognition of eternal truths:

Thus if one is fond of paradoxical phrases, one can actually say, and if one means the ambiguous phrase in the right sense, one can say in strict truth, that "*feigning*" makes up the vital element of phenomenology as of every *eidetic science*, that feigning is the source from which the cognition of "eternal truths" is fed (Husserl 1982, 160).

Modern commentators of Husserl have often drawn on this quote in order to support their anti-realist arguments. However, if one rephrases this quote in simple terms, it appears to be saying no more than this: "In order to see clearly how it happens that anything may be true or false in *reality*, one has to be able to grasp many possible ways in which that thing or event may be true and false in *imagined* situations."

(e) Summary

The remarks from *Ideas*, I would like to suggest, encompass a much wider scope in phenomenology than that of free variation. These remarks address the necessary conditions of creativity, problem solving, and imagination. They may be seen as discussing the cognitive and conceptual *grounds* of free variation. In this sense, free fantasy should be seen as a *primordial* notion in contrast to free variation which is, in my terminology, a particular cognitive strategy.

Yet, most commentators conflate free variation and free fantasy in Husserl's thought. They skip back and forth in their analysis of these two notions. Suzanne Bachelard, in her influential book *A Study of Husserl's Formal and Transcendental Logic* (Bachelard 1968), begins her discussion of free variation quoting the most important passages from Husserl's *Ideas*. She proposes to examine the process of "varying" which characterises the investigation of essences. Bachelard then claims that "fantasy transforms this example in whatever way it cares to; it `varies' it freely" (Bachelard 1968, 173). Later on, she states that "fantasized" figure does not have to remain self-identical in the fullness of its particular characteristics. In other words, a phenomenologist must not be blocked by the particularity of examples he has chosen.

As we can see from Bachelard's terminology, her understanding of variation is inextricably tied to the notion of fantasy. It is not always clear, however, how this mixture of fantasy and variation works. In one case, for

example, fantasy is used in an active sense since it is capable of "transforming" examples. In the other case, whole figures as presented as simply "fantasized."

Richard Zaner, in his article "The Art of Free Fantasy in Rigorous Phenomenological Science" (Zaner 1973), seems to be using the term "free fantasy" as if it were synonymous with "free variation." He appears to follow Bachelard in her investigations into free variation and/or free fantasy. He begins his article by explaining that "*any actual or possible instance* of the kind in question could as well serve as the starting point of the variation" (Zaner 1973, 194). Already on the next page, Zaner continues by discussing "freedom" appertaining to "free fantasy." Once again, it is not clear what exactly is the role of free fantasy since Zaner keeps addressing only the properties of free variation. He claims, for example, that variation has the sense of free optionalness and that it signifies that one is constantly free to start varying of any actual or possible example. Yet Zaner's article is titled "The Art of Free Fantasy in Rigorous Phenomenological Science."

This confusion has partly been created by Husserl's use of both terms "free variation" and "free fantasy" indiscriminately during various phases of his phenomenological enterprise. These two terms indeed have a lot of affinity. However, as I attempted to show, free fantasy is a much more primordial and much less rigidly defined notion than free variation. Additionally, Husserl makes a number of assumptions in his treatment of free fantasy:

- that the geometer, working on the particular problem, shapes and re-shapes figures in imagination
- that the eidetic pure thinking is largely either pictorial thinking or based on intuition: it is modified and enriched by observation
- that creativity and artistic intuition, and not analysis, should guide and influence eidetic research.

However, none of these assumptions necessarily applies to free variation.

It is one thing to claim that geometers discover the limits of their imagination by shaping and re-shaping figures in their fantasy. This claim would represent a somewhat limited conception of free variation as a particular cognitive strategy. However, it is an entirely different claim to say that the geometers *investigate* the problems, and *solve* them, by means of their fantasy. First, this latter sense differs from the notion of free variation. Second, the legacy of this assumption has been troubled by certain developments in modern mathematics. Most notably, much of the effort of mathematicians since the turn of the century has been aimed at axiomatization and arithmetization of geometry. When Hilbert (Hilbert 1899), for instance, axiomatized geometry he meant to eliminate intuition from the foundations of geometry. Nevertheless, these developments in the philosophy of mathematics do not exclude the possibility that geometrical, and even mathematical problems, may be solved by manipulating and varying some of their elements in one's mind.

Finally, I believe that I have shown that free fantasy in phenomenology should rather belong to the general discussions about the grounds of creativity

and about the complexity and open-ended nature of imagination. I further believe that free variation should be treated as a much more limited and concrete notion, i.e. as a particular cognitive operation.

(5) Critical Assessment of Phenomenological Free Variation

(a) How Free is Free Variation?

Freedom to engage in free variation does not imply that variation is free in itself. By analogy, the freedom to make a decision is not the freedom *in* making decisions. To take a simple example: one may be free to vary any aspect of the image corresponding to a general idea "car" choosing to keep that general idea constant. In doing that, one is engaged in an activity of free variation. However, the freedom to choose any parts of the idea "car" to be taken as a variable does not imply the freedom to choose to vary all of its aspects at once. The same goes for our decision to vary parts of the image corresponding to "car"

in some *respects*. The freedom to choose in which respect parts of "car" should be varied does not imply the freedom to vary them in all possible respects at once.

Given that there are many parts of the idea "car" and that any of these parts can be varied in numerous respects, free variation requires certain methods of implementation. Human cognitive powers are too limited to perform even a small fraction of all possible modifications of objects and respects of variation at the same time. For example, one may choose to vary "fender," "engine," "front door handle," etc. against the general idea "car" in respect of their overall shape, colour, thickness, style, level of rust decay, etc.

As a result of these limitations, generally attributed to the human cognitive capacity, free variation deals only with a small fraction of the vastly complex world of experience. Normally, free variation singles out properties, ideas, or objects, making them assume the role of either of two functional counterparts: "variables" and "constants." This basic functional framework of the activity of free variation shows that free variation is free only in principle; its application requires use of a highly ordered and constrained procedure.

It does not take much examination to realize that free variation in phenomenology has its roots in the mathematical conception of a variable. In mathematics symbols may be classified as "constants" and "variables." What is meant by these symbols in the actual use largely depends on a context. For example, a given symbol may be used to stand for the same object and thus be held constant - within a certain context. However, from "outside" this context, it

is indicated that the object may be any one (some one) object of some collection or set of a given domain of objects.

In performing free variation in phenomenology, one begins with certain concepts or objects which have been chosen to be the grounds of varying. Typically, this is only one element of the activity of variation: one still has to decide in which respect to vary the features of the chosen whole. Even that is sometimes not sufficient to fully capture all nuances of free variation. In some cases, for example, the *extent* of free variation might be an important factor. Keeping the notion "car" an object of free variation, consider the following: Examination, by free variation, of the dependence between the notion "car" and its wheels.² It goes without saying that one can easily imagine a car without its wheels - which have been, for example, removed, stolen, welded off, replaced by wooden blocks, etc., in one's imagination. However, the question remains whether one can imagine "car" (*all cars as such*) without wheels. The latter is far from logically impossible. It also suggests that the essence of the notion "car," if there is such an entity, depends on typification and somewhat contingent, technological development of the auto industry.

The latter suggestion may result in stipulating various degrees of exactitude and rigidity which can be expected from free variation, depending

² Assuming, of course, that one can attribute essences to the notion of "car." I disagree with Schütz, who holds that the "empirical concepts" represent types only and cannot be attributed any essences. After all, Schütz is the one who suggests that the difference between type and essence is one of *degree* rather than one of *kind*.

primarily on the nature of its objects. For example, the procedure of free variation leading to discovery of moments which belong to "car" should perhaps be distinguished from the procedure of free variation leading to discovery of moments belonging to musical tones. One might hold that the tone is a highly structured phenomenon which has "stable" moments. On the contrary, "car" is an artifact - an entity whose moments are subject to historical changes based on function, fashion, and technology. Consequently, free variation applied to tones would be of the "pure" and "proper" type, as opposed to "improper" free variation applied to "cars."

In some ways, the "improper" free variation should still be interesting to a theoretician. It has an important role in shaping and structuring "folk" imagination. For example, people are nowadays quite capable of imagining cars without wheels in a rather concrete manner, e.g. propelled by electromagnetic power and moving on air cushions. These reflections will be of importance in the later part of this thesis, concerning the idea of free variation broadly construed and termed "structured imagination" in cognitive science.

All of this should serve the purpose of suggesting that there are numerous formal and structural limitations and constraints on free variation. As I have attempted to show, free variation is constrained both by the nature of its execution and by the nature of its objects. It also indicates the importance of mathematical concepts and procedures in Husserl's phenomenology. Free variation is just one of numerous examples of implicit use of mathematical

concepts in Husserl. To mention another well known example, there is the procedure of "bracketing" in phenomenology which has stemmed directly from mathematics. In mathematics, in a manner very similar to that of phenomenology, to put a string of symbols in brackets is to put in suspense any operations that may be performed with these symbols.

(b) How Different is Free Variation from Induction?

In answering the question concerning the relationship of free variation and induction I will rely on David Michael Levin's article "Induction and Husserl theory of Eidetic Variation." Levin's article has been, in turn, significantly influenced by some important arguments advanced by Alfred Schütz in respect to the notions of type and essence in Husserl's philosophy.

In order to sketch Schütz's position allow me to briefly characterize the nature of the notion of eidetic consciousness in Husserl's thought. He portrays eidetic consciousness on a quite grand scale. It was by means of eidetic consciousness, as a mode of consciousness, that phenomenology hoped to secure its rock-bottom foundations. But how is it possible to acquire the eidetic mode of consciousness? As Maurice Natanson clearly and vividly explained, eidetic consciousness shifts from facts to essences by so-called *eidetic reduction*. Husserl was convinced that a phenomenologist must be able, at least in principle, to

engage in eidetic reduction with virtually any act of cognition. Here is how

Natanson illustrates a typical procedure of eidetic reduction:

Each time I look out the window, I see once again the same sight, the same buildings and foliage. I know that they are reliable features of my prospect, part of my world. Now, in eidetic reduction, I choose to attend to the scene in a different way. I set aside the actuality of the houses and the details of their ownership and history. The house across the way has a mortgage, a roof in need of repair, and a freshly painted door. I concern myself only with its being there for me and as a something seen and a something noticed. The mortgage drops away; the roof presents itself as a patchwork; the doors gleam bluely. That Haskall lives next to Immerbind no longer is a part of my viewing - that knowledge has been set aside (Natanson 1973, 66).

Only through the possibility of achieving eidetic consciousness could phenomenology expect to be the first and only genuine science; only through eidetic consciousness a priori, apodictic necessity was to be gained.

Schütz's major objective is to criticize such a lofty positioning of eidetic consciousness in phenomenology. He believes that the objects of eidetic consciousness, although distinct from the empirical sphere, cannot be seen as a totally idealized, self-sufficient, realm which would be fundamentally independent from the factual realm. Eidetic consciousness, Schütz maintains, has its origins in facticity and builds upon its resources of typification. Consequently, the difference between two modes of consciousness, eidetic consciousness and empirical consciousness, is one of degree rather than one of kind.

Using the latter claim, Levin extends Schütz's primarily epistemological point to methodological matters. According to Levin, induction and eidetic

variation are best conceived as continuous and complementary procedures. The most important ground on which Levin bases both the acceptance of Schütz's position and his own extension of that position is the examination of the complexity and peculiarity of the notion of "essence" in Husserl's thought. Levin's ultimate goal is to convince his readers that eidetic consciousness is fundamentally *inadequate* and *non-apodictic*. If his claims are justified, then eidetic consciousness, being neither adequate nor apodictic, does indeed resemble the inductive mode of reasoning much more than the deductive, exact, and absolutely certain mode of reasoning.

In which sense, according to Levin, does the process of eidetic variation fail to yield adequate and apodictic results? Levin points out to a very important feature of eidetic variation: the fact that we can terminate our explorations at any point, treating further variations as unnecessary. This fact is the corollary of the fact that the synthesized nexus of congruent elements *presents* that which is essential and *excludes* everything that is presumed nonessential. The crucial question regarding this procedure is the following: How can we know with *apodictic* certainty that amplification may not motivate an *essential* modification? In Levin's words:

What justifies eidetic consciousness in affirming that further variations cannot conceivably (possibly) introduce novel information - information of such a nature and of such weight that it would be rationally compelled to revise or even abrogate the authority of its original insight" (Levin 1968, 9)?

Levin goes on to argue that eidetic consciousness cannot, by itself, be the source of the apodictic certainty, since Husserl held that essences can be grasped with varying degrees of clearness, fullness, and differentiation. If the notion of essence is neither fully given to eidetic consciousness nor entirely *other* than eidetic consciousness, where should this notion belong?

Levin's analysis of Husserl's "essence" reveals that this notion has been expected to play a number of incompatible roles in phenomenology. Essence is expected to embody an object which is of transcendent (being other than consciousness) nature and which also represents an objective entity. If essence is of transcendent nature then it should, by that very nature, be irrevocably *other* than the consciousness and *related* to it. Additionally, transcendent objects are always "out there," i.e. they are accessible to recollection, attention, and so forth. As well, if the essence is an objective entity then it should represent a unity, an enduringly identical pole of meaning which is set against the acts of consciousness.

Husserl's transcendence, however, precludes adequacy in the fundamental sense. *Because* objects are objective and transcendent, Husserl maintains, our perception can only know them inadequately. Levin points out the following: "And essences have objective sense just as much as things, regardless of how much this sense is to be characterized more specifically, in other words, as transtemporal or, on the other hand, as spatiotemporal" (Levin 1968, 5). Husserl thus expects his essences to play two incompatible roles. Eidetic

consciousness is expected to achieve absolute, adequate and apodictic knowledge of essences, since they are *immanent* to eidetic consciousness. However, these immanent essences remain *transcendent* in the broadest sense of transcendence for Husserl, by virtue of their being "other" than consciousness. Instead of insisting on these two incompatible roles for eidetic consciousness Levin suggests his solution to this problem, which is largely based on Schütz's views. In simple terms, Levin suggests that induction and eidetic variation should be seen as two complementary procedures.

As I already hinted in this section, Schütz took great efforts to trace the process of ideation back to the natural attitude. The following rhetorical question, asked by Schütz, best expresses his beliefs about the limiting role of the natural attitude over the power of free variation in fantasy:

Is it possible to grasp by means of free variation in fantasy the eidos of a concrete species or genus, unless these variations are limited by the frame of the type in terms of which we have experienced in the natural attitude the object from which the process of ideation starts as a familiar one, as such and such an object within the life-world (Schütz 1959, 164).

Levin's solution to the problem of relating essentialist and empiricist approaches to eidetic variation is supposed to mitigate Husserl's radical division of immanent and transcendent essences. Levin believed that these two kinds of essences should not be seen in opposition but rather as continuous and even complementary.

There would still be a small class of "exact" essences, i.e. those found in mathematics, where the essences conform to a rigorously axiomatized system.

The "morphological" essences of phenomenology, however, are not determined by axiomatic systems. They are merely *disclosed* through a process of free variation. Although our eidetic knowledge of essences may be seen as *operative* in an a priori sense (it does not involve positing any spatio-temporal reality), our knowledge cannot have an absolute and apodictic grasp of the essences.

If Levin is to be taken seriously, it seems that there is a continuum of essences, disclosed by free variation, with two extreme poles. The first pole would involve a priori laws of necessity and would concern certain phenomena whose existence is either determined by the systems of definitions or divisible into several distinct and ordered dimensions. The second pole would involve certain typified structures and concern phenomena dependent on a particular society, language, technology, and culture.

When it comes to free variation, Levin was convinced that its nature comes much closer to disclosing what he calls "morphological" essences in phenomenology. Since these essences are of contingent nature and since one can disclose them with different degrees of certainty and precision, Levin surmised that the process of free variation cannot be all that dissimilar from induction.

It is sufficient to give just a few examples in order to show that there is the affinity between induction and variation:

- (1) All tones have some pitch
- (2) All crows are black

Both (1) and (2) can be used to illustrate either the process of induction or free variation. The only difference would be in the "direction" one is taking. In other words, one would proceed from accidents to general concepts in induction and from general concepts to accidents in variation. To take my second example: inductive reasoning reaches a more general conclusion, i.e. "All crows are black" based on numerous instances of observing crows of this colour. Free variation begins with a crow, understood as a representative of general "crow," and subjects it to numerous changes in order to discover its essential properties. For example, one might ask whether a bird would still be a crow if were made of brass, if it had scales instead of feathers, if it were white instead of black, etc.

(c) Does Free Variation Lead to Discovering Meanings Rather Than Essences?

The question that this section will attempt to discuss has, in large part, been prompted by Mohanty in his book "Transcendental Phenomenology." Mohanty's treatment of imaginative variation (this is the term he uses for free variation) is, in many ways, a continuation of the discussion of Husserl's free variation initiated by Schütz and Levin. Mohanty concedes that Husserl made unnecessarily strong claims on behalf of free variation, i.e. that it yields an apodictic insight into an essence.

He emphasizes, following Levin, that essences are of a transcendent nature in the sense that they are *other* than the mental processes that aim at it.

There is a number of things which can go wrong with the mental processes aimed at disclosing essences. For example, one might start with a poorly chosen example or one might give up varying prematurely. Phenomenologists often exaggerated in supposing that whenever an essence has been discovered, such discovery must be certain and apodictic.

The most interesting property of free variation, and starting point of Mohanty's criticism, is best illustrated by the charge of vicious circularity levelled against this method. In simple words, this charge amounts to claiming that the method of free variations is not at all a method of *discovery*. There is nothing in the result of free variation that was not, in some manner, already contained in the elements and the preparatory conditions of the procedure of free variation. Mohanty's own formulation of this problem is so well put that it deserves being quoted in full:

First, about the alleged circularity: the method requires that at some point in my imaginatively fabricating variants, I must be able to say 'this is *not* any longer a O'. The feature, then, whose, elimination of variation beyond a certain range makes me say so, must be (within that range) essentially connected with one of O's essential features. But how can I say 'this is not any longer O' unless I have already an acquaintance with what something must be like in order to be counted as a O or what something must lack in order to be ruled out from being a O. For someone who has no idea of what a O is (excepting the exemplar chosen by stipulation), it is not clear whether such a deviant variant is or is not to be counted as a O (Mohanty 1989, 33).

Mohanty's response to this charge is to admit that the vicious circularity objection cannot be refuted. But even if we accept this charge as being justified, Mohanty maintains, that acceptance will not have damaging repercussions on

the method of free variation. On the contrary, admitting that this charge is justified would only help us better understand the method of free variation.

Instead of saying that the method of free variation *discovers* essences we should, Mohanty suggests, construe it as *clarifying* the sense of concepts and ideas. In using the method of free variation, therefore, we typically proceed from an unclarified and muddled acquaintance to an explicit, clarified, and well-defined formulation. The main characteristic of this method is the following: Free variation unfolds until it discovers a resistance to the series of variations. The impossibility of further variations along the same line becomes clear. Phenomenologists would account for such a limit of free variation by claiming that these limits are used to trace objective and immutable essences. That is one of the reasons why Husserl used an analogy with a geometer to illustrate the manner in which free variation works.

Mohanty suggests a different account: His view is that the limitations to further variations represent one's implicit grasp of essences. To say the latter is to say that free variation is determined by the prior *understanding* of the *sense*. Mohanty's view of free variation seems to blend two, formerly distinct, senses of "discovery" and "constitution." In fact, Mohanty would like to claim that this blend can be found in Husserl's thought. And Mohanty is clear about the implications of this insight:

The implication is that the very same process which claims to 'discover' the essence, is also the process by which that essence is brought into being. The essence is fixed by the very same *decision* which prohibits any

further variant along that line. If further inquiry shows the legitimacy of admitting still more radical variants, we shall locate the essence elsewhere, constitute it anew, revise our prior claim to discovery and replace it by a new claim (Mohanty 1989, 37).

The advantage of this approach is its ability to account for the fallibility of the procedure of free variation. As well, this approach mitigates the dichotomy of realism and anti-realism: one can still use both the realistic locution of "discovery" and the anti-realistic locution of "constitution." The essences are seen, according to this view, as a product of a dynamic process of discovery and constitution. As Mohanty points out, the same decision which prohibits any further variant along certain line serves the purpose of establishing essences. In other words, discovering "resistance" to further variation leads to constitution of essences. This process is open to revisions; discovery of the new loci of resistance could lead to reconstitution of essences.

The disadvantage of this approach would be its inability to account for the objective sense that the products of free variation may exhibit. What if, in some important cases, free variation is not determined by any prior understanding of the sense? One has a feeling that some important features of free variation may be left out by Mohanty's account of free variation.

In particular, Mohanty's criticism of free variation proves to be particularly biting in the case of cultural phenomena and human artifacts. Consider subjecting a term "civil litigation" or an object such as "watch" to free variation. It is clear that any discoveries made by free variation in the case of

"civil litigation" and "watch" would only serve to disclose some aspects of our prior understanding of both of them. I will refer to this kind of free variation, and the limitations it appears to have, as "Mohanty's problem."

However, Mohanty's criticism seems to be much less convincing in the case of *phenomenal* objects, such as tones and sounds. Husserl would probably argue, *contra* Mohanty, that in case of phenomenal objects there is neither any prior understanding revealed by free variation nor is such understanding needed in order to launch the process of free variation.

Chapter Three

Reinach, Material Necessity and Free Variation

(a) Introduction

Adolf Reinach is a little known German philosopher. He was born in 1880 and died on the battlefield at the age of 34. Despite a very short academic career -- it lasted only slightly over four years in the capacity of *Privatdozent* -- he managed nevertheless to produce numerous philosophical writings of the finest quality, packed with brilliant insight and novel ideas.

Reinach was known by his colleagues as a follower of Husserl, but his work on the theory of judgment, the material *a priori*, and the *a priori* structures of social acts was largely overlooked by the main stream historians of philosophy. The systematic efforts of Barry Smith and Karl Schuhmann, who have edited all of Reinach's published works and manuscripts and who wrote extensively on Reinach and material necessity, helped rescue Reinach's thought from oblivion, particularly in the English speaking world. Reinach's philosophical work fits with the central notion of my thesis, free variation, in a manner which I will now attempt to sketch.

The philosophers and theorists I have presented so far, from Locke to Husserl, who dealt with free variation in either an overt or a covert manner, treated this mental activity almost exclusively as a cognitive tool. This tool or, perhaps better, this cognitive technique was seen as capable of disclosing the order of things as they might appear in one's mind. The relevance of this technique to the states of affairs in the real world and the mutual dependence between states of affairs and the technique of variation was seen by most philosophers as a matter of secondary importance. Particularly in more abstract

cases, it was difficult to see any relation between the techniques of freely varying concepts and images and the states of affairs in the "real world."³

In Reinach's case, however, free variation applies not only to the cognitive realm but also to empirical states of affairs. This follows from Reinach's belief that there are two basic kinds of necessity in logic and formal ontology.⁴ The first kind of necessity is a classical understanding of *modal* necessity, which has been given formal expression by logicians from C.I. Lewis to Saul Kripke. The notion of this kind of necessity has been present in the history of philosophy since Aristotle and has been systematically explored, for instance, by Leibniz. The second kind of necessity, *material* necessity, is a much more controversial notion. It consists of certain necessary connections among the parts of states of affairs. This latter kind of necessity, inherent in the states of affairs, will prove to possess many features in common with free variation.

One might want to know what, in fact, material necessity is, or at least what are the manifestations of material necessity in empirical states of affairs. In order to illustrate this, let me take one of Reinach's typical examples: an act of tearing a piece of paper. It is common knowledge that a normal act of tearing a piece of paper produces sound. This kind of act may, at least in a loose sense,

³ One is reminded of "Mohanty's problem" here: essences are disclosed in the case of *phenomenal* objects (tones, sounds) much easier than in the case of abstract, social phenomena.

⁴ Logic, according to Husserl's belief adopted by Reinach, deals with the "pure" meaning categories such as *truth* and *proposition*, *subject* and *predicate*. Formal ontology, in contrast, deals with the "object" meaning categories such as *object* and *property*, *part* and *whole*, *states of affairs*, and so on (See Husserl's *Third Investigation*, paragraph 11).

be seen as causally connected with the sound it produces. To put it in even stronger terms, one might claim that tearing a piece of paper *necessarily* produces sound. We could approach this problem from the cognitive perspective and reason in the following manner: *thinking* about tearing paper establishes in principle, perhaps with the help of free variation, that the sound of paper being torn depends on the act of tearing. One can imagine, for example, a piece of cardboard or cellophane or bond paper being torn to pieces. In each particular case, some sort of sound is bound to ensue unless, of course, one assumes that the tearing is performed in a vacuum or that one's ears are sealed at that particular moment.

However, Reinach would not limit these kinds of regularity to mere thinking and imagining. He would add that, in actually tearing paper or burning wood, some necessary consequences of those activities must occur. In the first case, tearing a piece of paper would produce sound, and in the second case burning wood would produce heat. This sort of direct dependence, Reinach argues, exists in empirical states of affairs.⁵ In other words, he would have it that certain necessary relations pertain not only to ideas but also to things. Following some of the basic ideas found in Husserl's *Logical Investigations*, Reinach believed that there is a wealth of essential *a priori* connections capable of being discovered among the things, events, and processes of the material

⁵ Until Hume's attack on causality, this was a view quite commonly held in philosophy.

world. Husserl did not explore the full range of possibilities implicit in this broad conjecture. Reinach felt that continuation of Husserl's idea was a novel and a worthwhile project.

(b) Reinach on Kant and Hume

In "Kants Auffassung des humeschen Problems,"⁶ Reinach gives an interesting and innovative interpretation of Hume's, Kant's, and to some extent, Locke's accounts of the relations of ideas. The central purpose of this paper, however, is to show that Kant and Hume, in their accounts of causality and some other possible relations of ideas, conflated two distinct aspects of necessity.

The main line of Reinach's argument deals with the kind of necessity that should be attributed to causal and relational propositions. Hume's insistence on discovering the basis for the necessity of causal propositions in experience is often contrasted with Kant's shift in the treatment of necessity. One of Hume's most important epistemic and metaphysical discoveries was that the mind is not capable of determining the effect in the supposed cause.

In the first *Enquiry*, Hume presented a case of two colliding billiard balls and asked whether or not the movement of one of them can be established as a cause of the movement of another. It was obvious, Hume surmised, that one's

⁶ Reinach (1989) and (1976).

search for a cause of motion in the second ball by the means of inspecting the motion in the first would necessarily be futile: "Motion in the second billiard ball is a quite distinct event from motion in the first: nor is there anything in the one to suggest the smallest hint of the other" (Hume, *Enquiry*, 18). Let me add that it was sufficient, in this case, to *imagine* two moving billiard balls in order to understand Hume's point.

Kant, according to Reinach, used Hume's finding to infer that for a relation to be a relation of ideas it is necessary for that relation to be of analytic nature; i.e. for its predicate to be contained in its subject.

Kant's inference, Reinach maintains, was too hasty: the relation between cause and effect is indeed a relation of ideas, but of a different kind. This particular relation of ideas is but one case among many other possible kinds of relations of ideas. It would be wrong, therefore, to expect causality to be representative of all other relations of ideas to which Hume either explicitly or tacitly refers in his writings. As Reinach puts it:

Causality signifies a necessary connection in the successive existence of two objects. It is not therefore totally independent of existence, as relations of ideas, in accordance with Hume's determinations, are wont to be (Reinach 1976, 172).

Some other relations of ideas in Hume are quite distinct from causality. The resemblance between Red and Orange, for example, contains nothing of existence, conditional or unconditional. It may appear unclear what grounds Reinach could have for distinguishing between causality and resemblance. In

particular, one might ask how we know whether any given relationship of ideas is independent of, or dependent on, existence. Reinach proposes a simple test:

If we can conceive an A, without at the same time conceiving a B that is causally connected with it, then this A can in fact exist without B's necessarily following upon it, i.e. it is not necessary that there be a causal relation between A and B. Or, seen from the other side: If the causal relation were in fact what it at first claims to be, i.e., a necessary connection between the existence of two objects, then the representation of one would also be necessarily connected with the representation of the other (Reinach 1976, 173).

One can imagine how this works in the case of colliding billiard balls, to stay with Hume's example. We can imagine a ball A hitting a ball B, without causing B to move (let us assume that B is glued to the billiard table). If we subjected the case of resemblance to this test, we would get some interesting and controversial results. To imagine red, and to imagine at the same time that it is not similar to orange would be contradictory to our understanding of resemblance. As Reinach stresses, this contradiction is quite distinct from logical contradiction. For example, stating "The colour blue is not similar to the colour purple" does not involve a logical contradiction. He further claims that Hume's arguments regarding notions such as resemblance reveal that Hume attempted to express this sense of impossibility which arises when one examines certain combinations of ideas in one's mind. Hume was aware that this was not a purely logical contradiction, that is why, Reinach maintains (Reinach, 1976,

176), Hume used the terms "incompatible" and "incongruous" ideas to mean "non-logical contraries."⁷

If one were to take the latter seriously, then one would cast serious doubt on Kant's belief that in Hume's thought, as far as relations of ideas are concerned, the predicate must always be contained in the subject. For one thing, it would be quite unreasonable to expect that the property of being similar to orange should reside in the very idea of red. Moreover, one has many reasons to doubt that, in every possible case, denial of the predicate in the subject-predicate relation involves logical contradiction. A further consequence of Reinach's argument would be that Hume never held that relations of ideas are analytic in Kant's sense and that the propositions of mathematics are exclusively based on relations of ideas.

Kant's belief that Hume was unsuccessful in providing any firm grounds for necessity in experience led him to believe that necessity is to be sought solely in relations among concepts. Kant, according to Reinach, sought to identify propositions expressing relations of ideas with judgments whose truth is "grounded in concepts," i.e., with analytic judgments in his restricted sense.

Thus Kant states in *Prolegomena* that:

⁷ Reinach further points out that Kant seems to have read only a German (Sulzer's) translation of the first *Enquiry* which uses the term "Widerspruch" (contradiction) where the original Hume's text does not contain the expression "contradiction." For example, where Hume's text calls the ideas of gold and mountain "two consistent ideas" (Hume 1993, 11), Sulzer's translation reads "zwey einander nicht widersprechende Begriffe" (Reinach, 1976, 177).

All analytic judgments are *a priori* even when the concepts are empirical, as for example, "Gold is a yellow metal;" for to know this I require no experience beyond my concept of gold as a yellow metal. It is, in fact, the very concept, and I need only analyze it without looking beyond it (Kant *Prolegomena*, 267).

One of the consequences of this view is the following: the nature of necessity which belongs to causal and relational propositions becomes much like the nature of necessity shared by mathematical and logical propositions. In other words, necessity is only to be discovered in the formal and semantic realms and not in the realm of empirical, contingent states of affairs.

It seems that taking Reinach's account of Hume and Kant seriously would undermine the Kantian view that relations of ideas are analytic connections among concepts. But if not this, what are they? Reinach puts forth a bold suggestion: the relations of ideas are the reflections of the relations of things. He believed that Hume, had he believed that necessity resided in things themselves, could in fact ground necessity in experience, a point completely overlooked by Kant. What Hume really wanted, according to Reinach, is to inquire into "necessary connections" which are determined by the nature of their terms exactly as similarity is determined by the essence of two colours. In other words Kant and Hume were talking about two distinct realms of necessity. Kant's inquiries were directed exclusively towards modal necessity whereas Hume's attention was mainly - although sometimes confusedly - directed towards material necessity. In Reinach's own words:

According to Kant's interpretation, Hume inquired exclusively into *modal* necessity, the necessity which causal propositions have in common with mathematical propositions. As opposed to this interpretation, we want to defend the view that Hume's attention was mainly directed towards *material* necessity, i.e., towards the necessity which does not at all belong to mathematical propositions. Naturally, we do not thereby mean that Hume explicitly and consciously distinguished between the two concepts of necessity; they were rather, thoroughly confused by him (Reinach 1976, 183).

Reinach's controversial claim opens the possibility that there are certain categories of entity, both in experience and in imagination, whose instantiation brings with it as a matter of necessity an instantiation of some other correlated entities. Before I turn my attention to the repercussions that this stipulation may have on the notion of free variation, let me examine the problem of presentation and meaning in Reinach's thought.

(c) Presentation, Meaning, and Free Variation

In his essay "On the Theory of the Negative Judgment" Reinach attempts to dispel what appears to be the inherent ambiguity of the term "judgment." He stresses that, in most philosophical literature, "judgment" stands both for "belief," "conviction," and "consciousness of validity" as well as for "affirmation" or "assertion." In the course of clarifying his own understanding of judgment, Reinach begins with an important distinction of Brentano's between presentation and judgment. One of the best known features of Brentano's theory of judgment constitutes an apparent paradox: Brentano strictly separated

presentation and judgment from each other, yet at the same time brought them closely together by postulating that of necessity every judgment has a foundation in a presentation. This is the way in which Brentano characterizes presentation and judgment in *Psychology from an Empirical Standpoint*:

Every mental phenomenon includes something as object within itself, although they do not all do so in the same way. In presentation, something is presented, in judgment something is affirmed or denied, in love loved, in hate hated, in desire desired and so on (Brentano 1973, 88).

In order to see presentation as a foundation for any judgment one would, of course, have to grant that presentation is in fact the very act of including something as an object in cognition. Later on in this book, Brentano makes an explicit distinction between presentation and judgment. He first states that we speak of presentation whenever something appears to us. For example, when we see something, a colour is presented, when we hear something a sound, and when we imagine something a fantasy is presented. In contrast, when it comes to judgments there is nothing "presented" as objects of judgments. By making a judgment, we either accept things (as true) or reject them (as false).

According to Reinach's interpretation of Brentano, any judged object therefore figures in consciousness in two ways: first as something presented, second as something accepted or rejected. This is a consequence of Brentano's thesis of the intentional nature of consciousness; its relatedness to something objectual, with respect to which the conviction is held, is essential. In Brentano's words:

We may, therefore, consider the intentional in-existence of an object to be a general characteristic of mental phenomena which distinguishes this class of phenomena from the class of physical phenomena (Brentano 1973, 91).

Reinach approaches the relationship of presentation and perception in a Husserlian manner. Consequently, he attempts to describe presentation as a phenomenon much broader than perception. Presentation is much broader than perception because the former includes various forms of memory, fantasy, and other related acts. This relationship between presentation and perception does not appear to be very controversial. But matters are much less clear when it comes to the relationship between presentation and meaning. Reinach attempts to address this relationship in his essay on the negative judgment.

We are free, in principle, to turn towards our objects of presentation both in reality and imagination. First, we can abstract our contents of presentation from their surroundings. In Reinach's words:

Anything that is presented is such that we can turn toward it with a specific interest, raise it up out of its surroundings, concern ourselves with its specific traits. In the sphere of meaning in our sense however there is no possibility of such modifications (Reinach (In Smith, ed.) 1982, 324).

The sphere of meaning, Reinach maintains, comes alongside the sphere of presentation: "It is, of course, precisely the same object which is at one and the same time presented and meant" (Smith 1982, 324). However, in determining and clarifying meaning we can only advert attentively to that which is presented (in some modification or other). Second, and much more generally, we can alter and manipulate most properties of the contents of our presentations both in

reality and imagination. If we did this within the sphere of meaning we would simply have changed meanings.

The discussion of the presentation and meaning in Reinach's paper can be used, I suggest, to cast some additional light on free variation. I would like to argue, following some basic claims of Reinach's, that free variation is only possible in the case of presentation and not in the case of meaning. Upon closer examination of Reinach's distinction between presentation and meaning, it becomes clear that one can perform numerous cognitive modifications and transformations with one's objects of presentation. In other words, one can present what appears to be objectively identical meaning using quite different means of presentation.

To illustrate this, let me give an example using Morse code. Imagine the situation in which one attempts to express the S.O.S. sign, using Morse code. The meaning of the S.O.S. sign is captured by the particular structure and arrangement of the two basic symbols (dot and dash) of the Morse code. The act of grasping the meaning of structure and arrangement of the constituent symbols is quite distinct from the act of presenting the signs. One may, for example, *see* dots and dashes since they can be presented graphically (...-----). One may *listen* to the shorter and longer tones played on a piano and still get the very same message. Alternatively, one can *touch* dots and dashes since they can be represented as impressed on a sheet of paper. The S.O.S. message is

presented in the visual, auditory, and tactile manner in the three cases mentioned.

One might add that, depending on the nature of presentation, certain structural properties of the phenomena which "embody" that presentation are revealed by free variation. For example, we can say that, in the case of visual presentation of the S.O.S. sign, the dots and dashes may be *darker* or *lighter*, *larger* or *smaller*, placed closer or more widely. In the case of auditory presentation, the sounds which are used may be *louder* or *softer*, their rhythm may be *faster* or *slower*, etc. Finally, in the case of tactile presentation, the impressions used to represent the S.O.S. sign may be more or less *massive*, their shape may be more or less *sharp* or *rounded*, etc.

In this case, Reinach would probably caution that the case of Morse code is a rather rare case of a system of signs which can be effectively and univocally presented by the means of several modes of presentation. Typically, the full significance of presented ideas, objects, or situations depends not only on their sources of presentation but also on the manner in which they are presented. As we shall see, variation plays an even more prominent role in distinguishing the manner of presentation from the content of presentation.

(d) Quality and Matter of Presentation and Variation

Husserl was one of the first to examine explicitly both the manner of presenting ideas and their content. He discussed, in chapter two of the fifth *Investigation*, what he termed the distinction between the general quality of cognitive acts and their content. This general distinction in cognition is rather subtle, so Husserl resorted to the easiest and the simplest way of illustrating and operationalizing this distinction -- variation.

Cognitive acts are classified by Husserl as presentative, judgmental, emotive, etc. according to their *quality*. I will call this feature of cognitive acts their "act-quality," as opposed to their "act-matter" (the content of cognitive acts). The act-qualities may be concerned with the same act-matter or, in Husserl's words, the same "intentional objectivity" of the cognitive acts. Note that Husserl includes all kinds of objects, such as real, ideal, genuine, possible, or impossible ones in his understanding of an intentional object.

How does one go about discovering act-quality in cognition? The following is a simple procedure of disclosing possible act-qualities which may be associated with the same intentional objectivity: Husserl noted that it is possible to present, question, hate, doubt, wish, judge, etc. the same intentional object. This phenomenon is a direct corollary of a simple cognitive technique -- keeping the intentional object constant and varying different act-qualities against it.

However, this is just one special case of variation:

Such variation intersects with the *other*, wholly independent variation in objective reference: one act may point to this, another act to that object,

regardless as to whether the acts are alike or different in quality (Husserl 1970, 587).

Husserl's point is that every act-quality can be combined with every intentional object. This other "direction" of variation, which straddles the first one, discloses some properties of cognitive acts which are plainly independent of act-quality. In particular, cognitive acts may differ in "manners of objective reference." In other words, cognitive acts of the same kind may be directed to quite different objects. For example, one might be making *assertions* about this or that phenomenon. To disclose this, one employs a technique of variation -- keeping the act-quality constant and varying different intentional objects against it.

Husserl's example of varying act-matter and keeping act-quality constant is the following: " $2 \times 2 = 4$ " and "Ibsen is the principal founder of modern dramatic realism" (Husserl, *Investigations*, 586) Apparently, both expressions are assertions and their common feature is their act-quality. His example of varying act-quality and keeping act-matter act constant is the following:

A man who frames the presentation 'There are intelligent beings on Mars' frames the same presentation as the man who asserts 'There are intelligent beings on Mars' and the same as the man who asks 'Are there intelligent beings on Mars?' or the man who wishes 'If only there were intelligent beings on Mars!' etc.etc (Husserl 1970, 587).

Husserl stresses that not all subtleties of variation are captured by the act-quality and act-matter distinction. It would seem reasonable to claim that cognitive acts are unambiguously determined by their quality and the object they intend. However, there are still possibilities of further variation even if

both act-matter and act-quality are fixed: "One can readily see, in fact, that even if quality and objective direction are both fixed at the same time, certain variations remain possible" (Husserl, *Investigations*, 588). He gives the examples of *equilateral triangle* and *equiangular triangle* and of what he considered synonymous statements, such as "It will rain today" and "It may well rain today." Husserl concludes that these subtle differences in equivalent (but not tautologically equivalent) expressions, discovered by variation, are in fact subtle differences in act-matter. He believed that "[t]here is not one piece of matter corresponding to an identical object, another to the differing mode of presenting it" (Husserl, *Investigations*, 589). This view can be contrasted with Frege's understanding of *sense* and *reference*, according to which the same object (reference) can be described in various ways, according to different modes of presentation.

Husserl also warns us that act-quality and act-matter are two mutually dependent moments of the acts. In other words, they belong together: there is no act-matter without some quality and no act-quality can be devoid of all matter.

The mutual dependence between quality and matter in variation also imposes some constraints on their structure. The most obvious result of this interdependence is the existence of limitations on the sorts of modifications which can be performed with the content expressed by a certain act of presentation. To be more specific, there are obvious limitations to the modifications which can be made affecting the *kinds* of the acts of presentation.

For example, it makes very little sense to desire or to mourn geometrical theorems. Equally so, it makes very little sense to refute or to smell musical scores. This sort of regularity, however, is not always immediately apparent.

Husserl's distinction between act-matter and act-quality has been independently rephrased by several philosophers in quite diverse fashion. I will provide just two examples: Henry Leonard's *concern* and *topic of concern* and John Searle's *propositional acts* and *illocutionary acts*.

Leonard defines concern and a topic of concern in the following way: "The concern of a purpose is that which the purposer wishes to accomplish; the topic of concern is, roughly, that proposition relative to which he has this concern" (Leonard, *Principles of Reasoning*, 140). He adds that in order fully to understand someone's purpose one must know both his concern and topic of concern. To illustrate this, Leonard offers the following examples:

Speaker A: Bill's house burned down last night.

Speaker B: Did Bill's house burn down last night?

Speaker C: Find out whether or not Bill's house burned down last night.

Speaker D: The price of butter went up one cent today.

Upon examination (using the "proper" kind of variation) it is found that the first three speakers had the same topic of concern, but they had different concerns with this topic. The fourth speaker, however, had a different topic of concern from the previous three, but his concern with this topic was the same as the first

speaker's concern with his topic, i.e both speakers A and D are concerned with *informing* their interlocutors about certain states of affairs.

John Searle's *Speech Acts* made a distinction comparable to Husserl's and Leonard's. He detached the notions of referring and predicating from the notions of asserting, questioning, commanding, etc. His purpose in making this distinction was to claim that in uttering sentences in the English (or any other) language speakers in fact perform several distinct kinds of acts. Searle believed that referring and predicating perform "propositional acts" whereas asserting, questioning, and commanding perform "illocutionary acts."⁸

Searle lists the following four sentences in order to illustrate his distinction between propositional acts and illocutionary acts:

1. Sam smokes habitually.
2. Does Sam smoke habitually?
3. Sam, smoke habitually!
4. Would that Sam smoked habitually.

Searle notes that in uttering 1, a speaker is making an assertion, in 2 asking a question, in 3 giving an order, and in 4 expressing a wish or desire. In the performance of each of these four speech acts the speaker performs other acts which are common to all four, i.e. the speaker refers to a certain object Sam and predicates the expression "smokes habitually." In Searle's words:

⁸ Later in this chapter, I will say a few more words about Searle's and Austin's speech act theory.

We thus detach the notions of referring and predicating from the notions of such complete speech acts as asserting, questioning, commanding, etc., and the justification for this separation lies in the fact that the same reference and predication can occur in the performance of different complete speech acts (Searle 1969, 23).

As illustrated by Searle's four sentences, the reference and predication are the same but they occur as a part of a complete speech act which is different in each of the four cases.

Note the similarity of the technique used by Husserl, Leonard, and Searle. All use the technique of variation to disclose certain properties of language and cognition. To put it more broadly, one could advocate a much stronger role of variation in philosophy and claim that this technique provides the means and the justification for various philosophical attempts at integrating philosophy and the theory of action.

In the case of Husserl, Leonard, and Searle, variation is employed in the following manner: they used sentences which represent varied act-qualities (concerns, illocutionary acts) while keeping act-matter (topics of concern, propositional acts) constant. Husserl and Leonard, but not Searle, noted that variation can be performed "at the other end:" both of them varied act-matters (topic of concern) while keeping act-quality (concern) constant.

Reinach does not discuss these matters. He is concerned more with the distinct ways in which phenomena may be not only *presented* but also *received* by the human mind. Reinach was convinced that there was a plethora of

regularities to be discovered by studying the ways in which phenomena are received by the human mind:

Colours are *seen*, sounds *heard*, things of the external world are *perceived by the senses*, numbers are *thought*, values are *felt*, etc. Thus even in the case of tones and colours it is an obvious requirement that we everywhere strictly distinguish the object of the act from the act itself, through which it is brought to presentation. Once given this distinction we recognize that there exists an abundance of the most interesting essential connections which correlate of necessity the various types of object with corresponding types of presenting acts (Smith 1982, 325).

It seems that most cognitive operations neutralize the peculiarities and the regularities of these "empirical import laws." Thus, for example, people talk as if they simply *remember* quite distinct phenomena, such as a musical piece, a fictional event that took place in a novel, or a characteristic scent -- all this without clear awareness of what the sources of presentations were and how they might have affected some of the structural properties of remembered events and the manner in which the events were remembered.

The role of variation, however, is still easily traced in this line of Reinach's thought. This becomes obvious if, for example, one asks how one would examine "the most interesting connection" between various types of objects with corresponding types of presenting acts.

Let me illustrate this by taking just one possible direction in which free variation might proceed. One could, for example, employ the technique of variation to examine the case of numbers and their relationship with, or dependence on, the various sources of presentation in cognition.

As Reinach noted in the previous quote, numbers can be *thought* without any particular representation accompanying that thought. However, number can also be *represented* by seeing a number of things, hearing a number of tones, or touching a number of objects. Sight, touch, and sound seem to be the non-controversial cases. Things get more muddled when one considers the possible relationships between numbers and their representation in smell and taste.

One could talk as if one remembers a number of different tastes and smells. I would oppose this and claim that discussion, in these two cases, naturally shifts from *numbers* to *kinds* of phenomena. Thus, people normally talk about sensing more or less characteristic, unpleasant, or thick smells rather than sensing certain numbers of smells or numbers of its nuances. Similar considerations can be applied to the case of tasting a new combination of flavours, for example. In this case, one would be interested in classifying this new taste rather than counting its ingredients.

This is just a brief illustration of the possible ways in which one can disclose, by means of variation, Reinach's "essential connections and dependencies" between various types of objects and various types of presenting acts in cognition.

The most general result of Reinach's distinction between meaning and presentation is that it discloses the dependencies of modes of presentation on their shared objective meaning. For example, the meaning of a mathematical theorem may be presented visually (printed in a book). The same meaning

might be presented in a radio lecture (auditorily). Reinach also emphasized that there could be talk about the dependency between the modes of presentation and their respective sources in the sensory receptors. In more general terms, Reinach believed that there was a vast network of laws and regularities by means of which the basic structures of nature and the social world become *intelligible* to the human mind. Equally so, he believed that there are laws and regularities by means of which the basic experience of nature and the social world becomes *available* to the human mind.

In the next section, I will move from the structural and cognitive aspects of Reinach's theory of material necessity to some of its broader consequences and its interesting connection with speech act theory.

(e) Reinach, Speech Act Theory, and Variation

In what follows I will examine some of the broader implications of Reinach's views on material necessity. In particular, I will discuss his implicit use of free variation and the potential application of some of his ideas to more recent discussions, specifically that of speech acts in analytic philosophy. Throughout this section, I will rely significantly on Barry Smith's and Kevin Mulligan's interpretation of Reinach's thought and its similarity to speech act theory.

The view that "out there," there exists an intricate web of dependencies in numerous kinds of social, material, linguistic, legal, factual, and behavioural

phenomena has been held, to a greater or lesser extent, by numerous philosophers. However, the need to postulate such kinds of dependencies is by no means self-evident. Consequently, this view requires some sort of justification and grounding.

A number of explanatory strategies can give this view some credibility. For example, one could resort to a version of pragmaticist argumentation and assert that human beings require some sort of structure in their understanding in order to get by in the world and to make sense of it. Alternatively, one could resort to some kind of transcendental epistemology and claim that certain structures in human understanding render that very understanding possible.

Despite the particular strategies of justification, however, such claims would still amount to saying, in very rough terms, that certain structures of knowledge are "hard wired" in the human brain. Not only are these structures "hard wired" but they are also intricately and significantly connected to numerous other features and properties of the human mind.

One of the consequences of this view would be the claim that the most basic structures and relations in cognition possess some kind of intrinsic intelligibility. As Barry Smith puts it:

It is such intrinsic intelligibility of the basic structures and interrelations of shape and motion, colour and sound, for example, which makes it possible for us to learn language and to acquire that sort of a posteriori knowledge on which empirical science is based (Smith 1992, 302).

This view goes hand in hand with the phenomenological view that the empirical and social world of experience is quite complex and intricate. It takes one additional step, i.e. assuming some kind of order or system, to surmise that the nature of phenomena is multi-categorical. It then becomes natural to claim that phenomena of distinct sorts are compounded to form more and more complex structures. Quite complex processes can thus combine linguistic, factual, legal, and numerous other kinds of phenomena. From all these phenomena ever new structures are formed.

A further consequence of this view would be the integration of the various kinds of social acts into the very stock of the world of experience. Social acts would be seen as interwoven into the other kinds of phenomena and, in some cases, seen as clearly dependent on some other kinds of phenomena. One example of this sort would be *necessitation* in social acts, i.e. the inference from promise to obligation.

One of the most convenient ways to operationalize this kind of dependence has been the use of the terminology of speech act theory. I cannot develop the nature and the history of this theory in this chapter. Instead, I am assuming that the readers are familiar with the basic versions of speech act theory developed by John L. Austin and John Searle. In a nutshell, speech act theory emphasized the role of the interdependence of utterances and actions in human communication and understanding.

Austin's theory of speech acts arose mainly from his conviction that a considerable number of utterances, even those which seem to assert things, were such that in most cases it would be impossible to characterize them as either true or false. His distinction between *locutionary* and *illocutionary* acts in language is a consequence of this general idea.

The locutionary utterance "The door is open" is normally made with reference to a particular door. An illocutionary act, in contrast, may be performed *in*, or perhaps even better, *by means of* performing the locutionary act. Thus, one can imagine an influential politician performing the illocutionary act of officially opening a prospect of negotiations between two states by uttering: "The door is open."

John Searle made certain methodological and terminological changes to Austin's speech act theory, primarily by replacing the distinction between locutionary and illocutionary acts with the propositional acts/illocutionary acts distinction. Nevertheless, Searle shares most of Austin's fundamental beliefs concerning speech acts. Most importantly, Searle believes that the units of human speech behaviour consist of linguistic expressions already integrated into speech acts. To avoid misunderstandings, Searle stressed that a speech act still is, and should be, the "basic" or "minimal" (Searle, *Speech Acts*, 16) unit of linguistic communication. To use Husserl's terminology, Searle believed that a propositional act and an illocutionary act, for example, are distinct but not independent parts of a speech act whole.

One can gather from this short sketch of Austin's and Searle's basic ideas that the role of context and background knowledge is crucial in speech act theory. The linguistic (or propositional) contents of utterances are coupled with numerous possible actions and contexts, in speech act theory, in order to capture an enriched notion of human verbal communication.

For a speech act to become fully functional, it is essential that all the surrounding circumstances obtain along with the utterances which convey the "elementary" linguistic message. Thus it is necessary to have all the "proper" circumstances, attitudes, contexts, etc. in order for a promise, for example, to attain a full legal and social sense of obligation.

The *category* of promise, in contrast, seems to be prior to any factual instantiation. The necessary laws governing promises can be *grasped* even in the absence of any factual instantiation. Moreover, it takes some mental variation in order to realize that the category of a promise can be placed in a number of possible contexts and situations: e.g. insincere, jestful or fictional promises. What one has done in this case is to employ a technique of variation and vary possible contexts, voice intonations, and circumstances against the basic category of a promise.

Moreover, it becomes clear that grasping a general category, a promise for example, renders certain modifications (variations) unacceptable. For example, it would not affect the *category* of promise if one were to say that one's promise was given in a dream. This promise would still be a "promise" which simply has

to be accepted as a fictional promise and which can not be the ground of an obligation. However, if one were to say that "I hereby promise something" can be modified to be: "I am playing music loudly in my dreams" anyone who understands what the term "promise" means would know that the latter is absurd. Discerning that certain modification to the general category of "promise" cannot be made, according to Smith, has to do with one's a priori grasp of the range of interpretations that certain abstract notions can have.

(f) Modification and Discovery of Essential Structures

The appeal to the realm of the a priori may have to do with the limits of modification. Related discussions concerning the problem of accounting for some kind of "essential kernels" in the linguistic, ontological, and cognitive realms also fall under the rubric of "modification" in the philosophical literature.

The root of the latter discussions are found in Husserl's fourth *Investigation*, paragraph 11: "Modifications of meaning which are rooted in the essence of expressions or meanings." Husserl points there among other things to the *suppositio materialis*, a scholastic term attributed to William of Occam. This kind of *suppositio*, later revived as the "use" and "mention" distinction, was used to account for the fact that every expression can also function as its own name, i.e. will name itself as a grammatical phenomenon. If one says "The Earth is

round' is a statement" one is concerned not with the *fact* that the earth is round but with the *indicative sentence* (Husserl, *Logical Investigations*, 514).

Husserl explained that what happens in cases like this is a subtle change the meaning undergoes, or more precisely, a subtle *modification* of that meaning. He held that: "What we have in mind here is not a verbal but a semantic compounding, or a compounding of words in which meanings remain constant" (Husserl, *Logical Investigations*, 513).

One could compare this sort of modification to Leonard's and Searle's modifications mentioned earlier in this chapter. Using Leonard's terminology:

1. (One is claiming that) "The Earth is round."
2. (One is examining the indicative sentence) "The Earth is round."

Both sentences have the same topic of concern. The concerns of the purposer(s) 1 and 2, however, are quite different.

Husserl further compared these modifications of meanings to arithmetical talk of "transforming" arithmetical patterns. This analogy might have motivated Husserl to claim that there are a priori laws which allow meanings to be transformed into new meanings, while preserving some kind of essential kernel intact.

As Kevin Mulligan points out, Husserl's *Investigations* were largely concerned with a felt need to develop a theory which could explain numerous kinds of dependencies. For example, one might want to explain what it is for a modified and unmodified form to have something in common. Husserl believed

that this was only possible if one allowed a vast number of deeply rooted dependencies in one's ontology. In Mulligan's words:

Not only do sign-uses fall under different meaning *categories*, by virtue of which they can combine to form higher-order unities that stand in relations of dependence, they also exhibit or contain syntactic, semantic, and morphological *features*. These features in their turn stand in relations of dependence to one another (Mulligan 1987, 74).

This sort of dependency has been examined by, among other philosophers, Twardowski. He employed what appears to be a technique of variation *par excellence* in his essay "Issues in the Logic of Adjectives" (Twardowski, 1979).

Twardowski begins this short piece by reminding his readers that adjectives are sometimes divided into two categories: determining and modifying adjectives. Determining adjectives, when added to a noun, attach either a positive or a negative characteristic to that noun (Twardowski's examples are "a learned man," and "inexperienced person"). Modifying adjectives, when joined to a noun, take away at least some of its original meaning. Additionally, a noun combined with a modifying adjective may become a name of an object to which the noun, taken in its original meaning, no longer applies (Twardowski gives examples such as: "artificial limb," "forged banknote").

Twardowski explained that a seemingly simple process of modifying certain nouns by certain adjectives in fact conceals quite complex functions. The case of "forged" added to "banknote," for example, seems to remove from the content of one's representations of a banknote precisely those characteristics which apply to genuine banknotes and replaces them by the characteristics

which are attributed to forged banknotes. Some properties of banknotes, however, remain constant in this process of modification. For example, both forged and non-forged banknotes are pieces of paper of the appropriate size, displaying an appropriate text, graphics, and numbers.

Twardowski defined the modifying function in the following manner:

The function of modifying includes, first the function of a partial removal of the content of the idea expressed by a given noun, and second, the function of replacing that removed part of the content - which is a result of combining a given adjective with a given noun - by other positive or negative characteristics (Twardowski 1979, 28).

One should add that this kind of modification may operate on several levels. It is quite possible to imagine that, due to poor minting technology, a country produces banknotes which look as if they were forged. These banknotes are then called "look-alike forged banknotes." In this case, there is a double process of modification: first of a noun "banknote" by an adjective "forged" and second of the adjective "forged" by an adjective "look-alike."⁹

Leaving Twardowski's main purpose of classifying adjectives aside, the similarities between the technique he used to test characteristics of adjectives and Husserl's free variation are striking. Also, as we will see in the next chapter, the analysis of "conceptual combinations" by cognitive psychology is clearly foreshadowed by Twardowski's analysis.

⁹ There is a drink in England, called *Babycham*, which is advertised as "The genuine champagne perry." This advertisement implies that this drink is the only genuine imitation of champagne.

(f) Conclusion

In conclusion, let me summarize the most important aspects of Reinach's theory of material necessity and its potential relevance to free variation.

Put in a nutshell, Reinach was the first modern philosopher to suggest, in an explicit manner, that a priori knowledge relates first and foremost to the relations - most importantly, relations of necessitation - which obtain between certain categories and objects. Reinach further believed that these relations exist objectively. One should note that this strong realist inclination is characteristic of a number of philosophers working throughout the Habsburg Empire. Recently, Rudolf Haller and Barry Smith introduced a "new" tradition in philosophy, "Austrian philosophy."¹⁰

Examples of this sort are readily found in Reinach's writings. Apart from a couple of his articles mentioned earlier in this chapter, which deal extensively with the nature of relations between objects and the concept of necessity, he left scattered remarks on necessary relations in his shorter essays which have been published posthumously. For example, he addresses the problem of necessary

¹⁰ In his recent book, *Austrian Philosophy*, Barry Smith lists several characteristics of this "brand" of philosophy. For the purposes of this chapter, the two most important characteristics are:

- A rejection of the Kantian revolution and the various sorts of relativism and historicism which came in its wake. Instead we find different forms of relativism and "objectivism."
- A concern with ontological structure and more especially with the issue as to how the parts of things fit together to form structured wholes (Smith 1994, 3).

relations in his short piece "Necessity and Universality in States of Affairs."¹¹ In attempting to solve this problem, Reinach introduced a special kind of necessity, not previously formulated in the history of philosophy. According to this interpretation of necessity, certain relations ground their universal validity in states of affairs. Reinach states that the claims such as: "Orange belongs between Red and Yellow" are universally valid without being analytic.

One may, following Barry Smith, extend Reinach's point and talk about relations in a much broader sense. One might see relations as enabling one to handle, classify, and operationalize basic categories such as colour, sound, or shape as well as some other, more complex, socially conditioned categories. In Smith's words:

Man, it is suggested, is born with an innate capacity to discriminate between instances of categories of the given sort - for this is not itself something that could have been learned - and hand in hand with this innate capacity goes the ability to grasp the associated relations of necessitation (Smith 1992, 320).

If this view is taken seriously then the activity of free variation must enjoy a special status in one's theory of cognition. Variation serves the purpose of discovering, testing, and clarifying the domains of necessary laws which are to be found in nature and in the social world.

¹¹ Reinach (1989) p. 353.

Moreover, the activity of free variation is helping to reveal a vast network of possibilities which constitute, for example, fundamental distinctions between the domains of the normal and the absurd in society. As Smith put it:

Thus there could be no culture or society in which the validity of contracts is in general made conditional on the parties' undergoing painful surgery, or on the finding of a proof for some hitherto unproved conjecture in mathematics. The absurdity of such modifications is grasped immediately by anyone with even a cursory familiarity with entities of the sort involved. It is an a priori necessity (Smith 1992, 312).

This augmented role of variation would make it work on a quite fundamental level, helping people shape the very possibilities of, for example, contracts in society. Variation would also work in an essentially *negative* fashion, by constantly eliminating certain absurd configurations in the process of manipulating certain contents of one's thoughts. In this sense, one could claim that variation is essentially a technique which discloses the *limits* of certain semantic and ontological structures.

Chapter Four

The Role of Variation in Cognitive Science: Structured Imagination and Conceptual Combinations

(1) Preliminary Remarks

(a) Introduction

What is the role of free variation in cognitive science? I will attempt to answer this question, as it often happens in philosophy, by dividing it into two separate questions: (1) What role does free variation *already* (implicitly) play in cognitive science? and (2) Would cognitive science benefit by inquiring (explicitly) into the role of free variation?

I will attempt to show that free variation already plays an important, although not always explicit, role in cognitive science. Additionally, I will suggest that explicating the role of free variation in cognition may be seen as a vital component of maintaining the strength of certain approaches and "schools" of cognitive science. To illustrate this, let me present the relevance of variation in disputes between the connectionist and more traditional theories of cognition.

The dispute between more traditional (propositional and "language of thought" based) understanding of cognitive science and recent connectionist theories may be seen as centred, in part, on the role of variation (manipulation) in cognition. More traditional account would appeal to the fact that the correspondence between formal languages and propositional content may be seen as dependent upon the combinatorial structure of strings of symbols. Thus, one may claim that sentences have parts with both fixed and adjustable meanings and that we form new meaningful sentences by rearranging these parts in new combinations. In this case, the ability to vary parts of structured

sentences may be seen as quite significant: this ability would help us account for our understanding of propositions we never encountered before.

Instead of appealing to the paradigms of cognition which involve either strings of symbols or some sort of propositional structure, connectionists would rather appeal to some type of neural architecture. They argue that the properties of some sort of functional networks in cognition represent the properties of neural activity much closer than the properties of any sequential symbol-processing system. The problem of variation, however, did not go away. It still remains to be solved, only transferred to the level of motor processes and image transformation.

(b) Free Variation, Structured Imagination, and Conceptual Combinations

I began my treatment of Husserl's *Logical Investigations* by remarking that while his book does not deal directly with the notion of free variation, a thorough grasp of this notion is nonetheless required to understand some of the fundamental problems of phenomenology.

In a similar manner, I want to begin my treatment of structured imagination and conceptual combinations in cognitive science by noting that one would not encounter the notion of free variation directly and explicitly if one were to inquire into either of them. However, I would like to argue that the way in which cognitive science understands "structured imagination" and "conceptual

combinations" implies tacit use of principles and structures of a complex cognitive strategy -- which has been much used in phenomenology, logic, and general epistemology namely, the strategy of free variation.

It should be noted, however, that I am not claiming that inquiry into "free variation" by phenomenologists should be seen as identical to the inquiry into "structured imagination" and "conceptual combinations" by cognitive science. There are notable differences between the three notions, differences which will be discussed later in this chapter. Nevertheless, behind both of the notions there is, I believe, an elementary and primitive activity of the mind, namely, the activity of *free variation*. This activity can be described in simple terms: varying, in one's mind, some aspects or elements of a compound structure, while keeping some other aspect or elements of that structure constant.

In the course of examination of this activity, we will see that neither the underlying structure nor the elements being varied need always be specified or made explicit in thinking. On the contrary, the activity of free variation appears to be a mostly automatic and unconscious mechanism both in real-life and in experimental circumstances.

Before I present the notion of structured imagination as developed in *Creative Cognition* by Finke, Ward and Smith, let me sketch my basic understanding of contemporary cognitive science. Cognitive science can be characterized as a relatively new field of research, straddling the disciplines of philosophy, psychology, computer science, linguistics, neurology, and

neuropsychology. Cognitive science, in general, attempts to test and advance the "functional" and "computational" models of thought. As Johnson-Laird remarked, in *The Computer and the Mind*, the advance of the "age of computability" has resulted in the following conjecture: "Perhaps the mind stands to the brain in much the same way that the program stands to the computer" (Johnson-Laird 1988, 8). This conjecture, based solely on a powerful and heuristic analogy, has led to a large number of computational theories about various functions and properties of the mind.

In order to achieve its primary goal, the scientific explanation of mental phenomena, cognitive science adopts the naturalist and empiricist approach to mental phenomena. Alvin Goldman, in his *Philosophical Applications of Cognitive Science*, clearly and succinctly sums up the empirical grounds of cognitive science: "How people ordinarily represent or understand mental concepts (a central problem in philosophy of mind) is ultimately an empirical problem requiring theoretical and experimental investigations appropriate to cognitive science" (Goldman 1993, 63).

(2) Structured Imagination and Free variation

The first problem that cognitive science encounters in its treatment of imagination is conceptual or definitional. In other words, cognitive science needs to sketch the limits of the concept of imagination. In order to do this, cognitive scientists adopt, overtly or covertly, several assumptions about imagination. Here are some of the more important characteristics ascribed to imagination in *Creative Cognition*:

(1) Imagination involves the generation and experiences of ideas that go beyond what is currently known (114). However, it is important to add that the imagination does not go outside the bounds of known reality.¹²

(2) Imagination results in some tangible product - in contrast to fantasy, dreaming, and so on.

¹² In order to clarify what this term "known reality" may possibly mean, it would be interesting to compare this view to Frege's *Foundations of Arithmetic*. In this book, Frege claimed that the imagination does not go beyond the bounds of geometry.

(3) Imagination is not a mysterious process through which new ideas spring into being full blown and with no obvious link to existing cognitive structures. On the contrary, imagination is influenced by existing knowledge frameworks. That is why the authors of *Creative Cognition* use the term "structured imagination."

(4) Imagination is different from mental imagery in being both more global and more restrictive than mental imagery. This is how the authors of *Creative Cognition* put it:

Imagination is the process by which people mentally generate novel objects, settings, events, and so on. It is more global than mental imagery in the sense that although these imagined entities might take on the form of mental images, they need not. Imaginative products can also exist in the form of verbal description. Imagination is also more restrictive than mental imagery in the sense that it must involve the generation of something new, whereas certain manifestations of mental imagery can be purely recollective (Finke, Ward, Smith 1993, 115).

As we have seen from this sketch, the understanding of imagination in *Creative Cognition* is based on several assumptions. The most fundamental one, however, is the assumption that imagination is necessarily *productive*. Once this assumption has been made, the others follow naturally. For example, the claims that imagination needs to be *innovative* and that imagination has the tendency to be *predictable* can both be seen as a consequence of the assumption that imagination is productive.

These assumptions about imagination are readily justifiable since they stem from general methodological requirements. Cognitive science relies on empirical data and it needs certain testing procedures in order to theorize about

imagination. Research involving empirical data is only possible if there are some empirically testable phenomena "out there." However, one may remark that insistence on empirical data in theorizing about imagination should not be attributed exclusively to cognitive science but to any other philosophical or theoretical approach concerned with imagination. Consequently, one may express doubt about any serious sense in which imagination could be taken as non-productive. In order to illustrate at least some senses in which imagination can be seen as non-productive, let me elaborate the two cases: imagination in its "adverbial" usage and imagination in the "constructivist" sense.

(a) Some Alternative Views on Imagination

One usage in which imagining is not seen as a purposive action with tangible results could be defined in this way: one could understand imagining not as a verb but as an adverb. Instead of talking about an activity of "imagining" or "imagination" *per se* one would see actions, events, designs, and writings as produced, induced, or brought forth "imaginatively." For example, one would be able to say that a solution to a mathematical problem has been worked out imaginatively, or that an ice skater has performed some of the necessary moves imaginatively.

A generation ago, some philosophers might have argued that the adverbial use of "imaginatively" is the core or central use. "Ordinary language"

philosophers, influenced largely by Wittgenstein's later writings, refused to acknowledge the existence of any intrinsic qualities, states, or dispositions in human cognition. Influenced also by behaviourist approach to human psychology, ordinary language philosophers tended to characterise human cognition by the *effects* it produces in human behaviour. Consequently, the activity of "imagining" would, properly speaking, not exist. There would only be certain actions or events brought forth in an "imaginative" manner.

Take, for example, Ryle's discussion of intelligence in *The Concept of Mind*. In this book, Ryle criticizes the belief that there is "intelligence" behind one's "intelligent behaviour." According to Ryle, there are neither special prescriptions for intelligence nor is there a special place for intelligence in one's mind. This is how he characterizes a person who reasons logically:

He reasons with a correct method but without considering the prescriptions of a methodology. The rules that he observes have become his way of thinking, when he is taking care; they are not external rubrics with which he has to square his thoughts (Ryle 1949, 48).

Ryle proposes that to say that a person argues intelligently is to adjudge that person by certain criteria (such as being cogent, clear, and so on). Silent argumentation falls into the same category, although it is not subjected to the criticism of audience and readers. Furthermore, argumentation is always unique: the argumentative setting, the particular issues are never the same.

Imagination, understood in this sense, would be much more difficult to describe and analyze than the notion of structured imagination. Additionally, it

would be very difficult to see what the *products* of such notion of imagination would be. What is the problem with attempting to square Ryle's and cognitive science approaches to human intelligence and creativity? A misunderstanding or some sort of a category mistake?

Instead of pointing out the shortcomings of "ordinary language" understanding of imagination, it is much more important, I believe, to point to a change in methodology. This change is implicit in most non-productive interpretations of imagination. Such interpretations require that the methodological approach becomes *normative* much more than theoretic and descriptive. In other words, imagination would have to be oriented towards an implicit or explicit norm, or the basic criterion, for ascribing the term "imaginatively" to actions and events instead of relying on products of the process of imagination.

Another essentially non-purposive and non-productive approach to imagination can be found in thought of Nelson Goodman and Jerome Bruner. Bruner follows Michael Halliday in dividing the functions of language into two superordinate classes - *pragmatic* and *mathetic*. The pragmatic class contains functions such as the instrumental, regulatory, interactional, and personal. The mathetic class contains the heuristic, imaginative and informative functions. The mathetic class is an interesting one for the purposes of this chapter. The heuristic function of language is to gain information and correction from others. The informative function of language presupposes intersubjectivity; that

somebody has knowledge I do not possess and vice versa, and that there are ways of communicating this kind of knowledge. The imaginative function of language is defined by Bruner as "...the means whereby we create possible worlds and go beyond the immediately referential" (Bruner 1986, 125). Bruner's understanding of imagination and its link to possible worlds has been largely inspired by Nelson Goodman's understanding of possible worlds.

Goodman argues that what we call the "world" is a product of a mind whose symbolic procedures construct it. In the case of perception, for example, it has often been claimed in philosophy that the world of appearance, the very world we live in, is "created" by the mind. Imaginative creation of possible worlds would be, therefore, just one of the means of constructing reality, although an extremely important one.

In this second case we see that the notion of imagination appears integrated into a much broader world view, one which relies on numerous metaphysical assumptions. The role of imagination in this world view is undoubtedly significant. However, this kind of imagination lacks precise definition and cannot be empirically tested. If it became abstracted from its metaphysical background, this understanding of imagination would lose most of its meaning. Additionally, since the focus of this chapter is variation and some other related concepts in cognitive science, it would be difficult, at the same time, to keep this focus in mind and to retain Goodman's "large metaphysical picture."

(b) Structured Imagination Empirically Tested

The authors of *Creative Cognition* began their examination of structured imagination largely influenced by the research in structured imagination conducted by cognitive psychologists. This research revealed that attributes of real-world categories, instead of co-occurring randomly, tend to occur in distinct clusters. "For example, feathers and wings occur much more often together than do fur and wings" (Finke, Ward, Smith 1993, 118). The traditional tests indicated, additionally, that correlated attributes are so inherent to human cognition that even infants as young as ten months of age appear sensitive to them.

Thomas Ward conducted a number of experiments in 1991, results of which were presented in a paper under the title "Structured Imagination: The Role of Conceptual Structure in Exemplar Generation" to the meeting of the Psychonomic Society in San Francisco. Ward's research was largely integrated into the chapter "Structured Imagination" in *Creative Cognition*. What follows is a short description of the first of Ward's several studies:

In the first study, Ward gave fifty college students the task of imagining a planet that exists somewhere in the galaxy but is similar to earth in size, terrain, and climate. They were then asked to imagine and draw an animal that lived on that planet. Because the planet was described as similar to earth, the properties of the exemplars served as a baseline against which to compare exemplars from subsequent studies in which that planet was described as being very different from earth. In addition to providing the initial drawing of their imagined animal, subjects responded to questions about the diet, habitat, sensory organs, and

appendages of the creature. The questions were designed to provide information about nonvisible properties of the creatures and to help clarify ambiguities in interpreting the visible properties of the drawings (Finke, Ward, Smith 1993, 119).

The results of the study indicated that a large majority of subjects drew creatures with highly predictable features, such as bilaterally symmetric individuals with at least one major sense organ and at least one major type of appendage. In other words, the way in which the tested subjects used their imagination indicated a strong influence of familiar and characteristic features implicitly correlated to certain categories:

Rather than being idiosyncratic and unpredictable, the use of imagination to generate new exemplars of a category appears to be highly structured by the characteristic attributes of known category members (Finke, Ward, Smith 1993, 120).

Furthermore, Ward showed that subjects could be expected to structure their free variations in imagining, both within and between categories. For example, subjects would typically vary shape across species but not within species. In simple words, a fish, imagined or drawn on paper, would appear to have an entirely different shape from a bird. However, once a fish-like creature has been chosen, the extent of variations within the chosen species becomes greatly limited. Finally, if the subjects were asked to generate a second member of the same species, it is most likely that they would vary just its size.

(c) Categorization Models and Schemes

Categorization models are important not only in recognizing categories but also in generating new members of a given category. The person appears to evaluate an entity against some stored representation of the category in deciding whether the given entity is a member of some known category.

However, categorization may depend on the initial set of requirements or, in other words, the initial restraint parameters. To illustrate this, consider what I have termed interspecies and intraspecies variation. One might begin the process of free variation with a broad, abstract category. For example, one might begin with the more general category of an animal, "mammal," which is associated with a number of salient properties and generate a fitting concrete exemplar by varying different kinds of animals against this category. One may produce a dog, a cat, a cheetah, etc. by this kind of variation. Finally, one might produce a novel kind of animal by combining some known properties of mammals. This kind of categorization might be termed categorization by *interspecies variation*. Second, one might begin with a concrete example of an animal and mentally vary some of its parts. For example, one might produce different breeds of a species "dog" varying some of its parts: ears, tail, hair length, etc. Combining the known breeds, one may produce a novel breed of dog. This kind of categorization might be termed categorization by *intra-species variation*.

Schemes are even more complex knowledge structures than categories. They have also been called "scripts," "frames," and "concepts." Categories, in contrast, consist of single kinds of objects that share certain taxonomic links.

People recognize that more abstract categories might be divided in various ways, following different taxonomic features. Thus we speak of time-measuring devices, among which are sundials, hour-glasses, clocks, watches, and stop watches. Notice that there may be very little actual similarity between the objects that fall under the abstract category of time-measuring devices.

Moreover, hour-glasses and watches, for example, may alternatively be defined as each falling under separate and distinct categories, e.g. the former under glass art objects and the latter under mechanical devices.

Schemes are even more complex entities, and somewhat more arbitrary structures than abstract categories. They tend to straddle taxonomic boundaries. This is how *Creative Cognition* contrasts schematic and categorical thinking:

In contrast, schemes specify the relations among several discrete categories, and these often cut across standard taxonomic boundaries. A schema for a living room might contain not only chairs, televisions, paintings, and other discrete categories but also the typical relations among them (Finke, Ward, Smith 1993, 134).

Cognitive science makes use of schemes in the following manner: plausible inferences and problem solutions are generated by means of schemes, or clusters stored in memory. These clusters can be accessed as large units which contain information about the likely properties of the environment.

Schemes, in general, have an important impact on encoding new information, retrieving old information, and inferences based on that information. Schemes also guide and limit imagination. For example, a

characteristic hat and pipe still constitute a "Sherlock Holmes" schema. It is interesting to note that neither of the two objects, in the form in which they exist in common perception, have been introduced by Sir Arthur Conan Doyle. They are the product of the imagination of subsequent Sherlock Holmes illustrators. However, generations of readers of Sherlock Holmes have had their imagination shaped by such a schema. Schemes are stubborn; it usually happens that people form exception rules for cases that do not fit existing schemes rather than change the more general schema.

Ernst Mach wrote about the inherent need for "economy of thought" in human cognition which is particularly evident in scientific thought experiments. This general regulatory principle requires that people employ the maximum number of typical, routine problem solving techniques even in ordinary thinking processes. However, people are often faced with atypical events and objects. "In everyday life we are often faced with inputs that do not readily fit any prestored category representation" (Holland, Holyoak, Nisbett, and Thagard 1986, 13). In cases like these, people introspect the novel situation and solve the problems by the simultaneous activation and integration of multiple schemes.

However, the role of schemes in cognitive processes is by no means exhausted by problem solving. Schemes may, for example, be employed to serve a humorous function. Cartoonist Gary Larson has created funny situations in his "Far Side" series by juxtaposing mutually exclusive, or extremely distant schemes.

(d) Structured Imagination and Variation

Let me now turn to what I believe to be one of the most important feature of structured imagination, namely, the activity of free variation. Most of the experiments concerning structured imagination in *Creative Cognition* employ the following strategy: the subjects were asked to extend a property, for example "intelligence," of a creature living on earth to some, slightly altered, imaginary instances of that creature living somewhere in the universe. It appears that the subjects were supposed, although tacitly, to produce the creatures which would be different from humans to some degree. In other words, the subjects were asked to imagine *variants* of the known and familiar category "intelligent creature living on earth." Thus, the process of free variation kept most of the typical properties of "intelligent creature" or "human being" constant, while placing this imaginary creature, in the process of variation, in a slightly altered environment: "living on a planet similar to earth." There was a degree of freedom, of course, left to decide how and where to implement variation in imagination. First, the concrete features of this imaginary planet were not specified -- the only thing specified was its apparent similarity to earth. Second, the typical features of the earthly human creatures to be kept constant in imagination were not specified. One could keep certain typical human features constant and vary some others. For example, one could choose to attribute to this imagined creature two human-like legs and to give it several antennas

instead of arms. However, the subjects of those experiments seem not to have exploited this freedom of variation in structured imagination to a great degree. They have largely chosen to keep most typical features associated with "intelligent creatures" constant by default processes of cognition, as it were.

In contrast to phenomenology, which appears to be oriented towards pure contemplation and discovery of essences, cognitive science is practical and theory-oriented. Its understanding of imagination involves the notion of *intervening* in the process of free variation. This intervention serves the role of rendering the products of free variation interpretable and useful to the process of theory formation. Consider, for example, varying some aspects of the notion "car," which was mentioned earlier in the chapter on phenomenology.

Phenomenologists would resort to "armchair" mental experimentation and vary different aspects of a phenomenon "car" in their minds in order to examine which features (or which combination of features) are essential for it to still be a car. A cognitive scientist would almost certainly intervene in the process of free variation with two basic motives in mind.

First, a cognitive scientist would strive to better structure the process of free variation, limiting it by some additional constraints. Second, a cognitive scientist would primarily set a process of free variation in a manner such that it results in a tangible product, e.g. in drawing.

If a cognitive scientists had to deal with subjects imagining anything about "car" their procedure would be quite different from the phenomenological

one. The subjects would likely be asked, for example, to imagine a planet similar to earth where human-like intelligent creatures "see" things by using ultrasound. Their vision does not depend on light. What would their cars look like? Subjects would probably keep, in their imagination, constant most of the known properties of cars, such as engine, wheels, passenger and driver seats, etc. However, they would probably, in their imagination, remove glass windshields and windows and replace them, for example, with some sort of ultrasound "ears" or radars placed on the front and the back of that car. To make this product of the imagination more intuitive, one could perhaps call it "batcar." Finally, the final product of this process of free variation would be drawn on paper. Consequently, the results of such an experiment may be used as material for the statistical analysis and interpretation.

In this short discussion I have indicated, I believe, close dependence between "structured imagination" and "free variation." It appears that structured imagination in cognitive science makes use of free variation as a vehicle, or as a primitive cognitive procedure. In the next section, I will attempt to show that the process of "conceptual combinations," as presented in cognitive science, makes use of free variation in a manner similar to what structured imagination does.

(3) Free variation and Conceptual Combinations

(a) Introduction

Inquiry into combining of concepts in cognitive science has been prompted by the attempts to characterize the structure of conceptual knowledge in human behaviour. The problem to be solved has largely consisted in giving an account of the employment of what were considered relatively static pockets of information (definitions, schemes, frames) in greatly varying contexts. These packets of information, however, appear not only capable of fitting the diverse contexts but the concepts within the packets of information have the capacity of being combined in various manners. This latter phenomenon just adds to complexity and dynamic nature of the human conceptual knowledge which emerges in the concrete process of cognizing.

In order to illustrate the approach which cognitive psychology adopts in order to inquire into conceptual combinations I will examine some issues presented in the paper "Context and Structure in Conceptual Combination" by Douglas L. Medin and Edward J. Shoben, though I will not go into the particular theoretical background which this paper seems to be addressing. I will focus on the extent to which inquiry into conceptual combinations by cognitive psychology makes use of the basic and primitive cognitive operation, that of free variation.

In cognitive psychology, conceptual combinations are the best demonstration of the basic need for concept flexibility:

One of the basic properties of the categories is that they can be combined to form more restricted concepts. Thus, we can restrict birds to songbirds, water birds, predatory birds, and migratory birds. In addition to these combinations, we can construct and understand novel combinations such as gregarious birds or noisy birds (Medin and Shoben 1988, 160).

Cognitive psychologists, striving to give an empirical account of human conceptual knowledge using the computational models of explanation, have to grant that it is extremely unlikely that people have a stored representation for every possible conceptual combination. This is not just because there would be too many possible combinations but also because the pairing of terms involves some sort of augmentation of their initial "semantical mass." For example, the pairing of adjectives and nouns does not involve mere conjunction of attributes of two constituents. In Medin and Shoben's words:

For example, although most friendly people are warm and outgoing, it seems silly to describe a computer in this way. Moreover, in conceptual combinations such as *pet fish*, the constituents often have competing values on some dimensions; most pets have fur as their body covering, yet *pet fish* have scales (Medin and Shoben 1988, 160).

However, in order to understand how people structure and remodel categories and schemes, one seems compelled to examine conceptual combinations. One particular case combining the elements of language and cognition, that Medin and Shoben chose to examine in their article, is the combination of adjectives and nouns.

Research in cognitive psychology has already indicated that concepts are generally organized on the basis of their typicality which, in turn, is based on common similarity standards. For example, pictures of typical examples (e.g.

robins) are identified more rapidly when preceded by a category label (e.g. bird). When it comes to combination of nouns and adjectives, one of the models adopted in order to account for conceptual combinations in cognitive psychology was the modification model. This is a short description of the modification model:

The modification model postulates a pair of simple mechanisms by which the meaning of a conjoined category can be derived from the individual meanings of the adjective and noun constituents. The basic idea is that the adjective directs the knowledge restructuring in a straightforward manner by restricting the range of acceptable values and by increasing the importance of the corresponding dimension. If one considers the color of an apple, for example, one notes that most apples are red, but that some are green or yellow and that a few are brown. According to the modification model, for the conjoined category *red apple*, the acceptable values are restricted to red and the dimension of color is given more weight or importance than it has in the simple concept of apple. The typicality of potential instances of the red apple will be a function of their similarity to the newly created prototypic red apple (Medin and Shoben 1988, 161).

However, Medin and Shoben argue that models that attempt to explain combined categories by adding or changing a single feature have largely been unsuccessful. It appears that attributes are interdependent and that correlations of the attributes are a matter of common knowledge and largely dependent on the context. It seems that one of the most difficult hurdles to any "single feature modification model" of explanation of conceptual combinations is solving the problem of centrality. Let me present this problem in the next section of this chapter.

(b) Centrality and Conceptual Combinations

Medin and Shoben approached the problem of centrality in conceptual combinations in the following way: they generated concept properties that would always or nearly always be true of two different concepts but perhaps more important in one concept than another. Here is their own account:

For example, we felt that the shape of a basketball was central to the meaning of the concept. If a basketball is not round, then it cannot be a basketball because it cannot be dribbled, passed, or shot in the manner that is characteristic of the game. On the other hand, we believed that shape was relatively less important for a cantaloupe. Although square cantaloupes never occur in nature, by our intuitions there is nothing essential about the shape of a cantaloupe (Medin and Shoben 1988, 175-176).

The shape of a basketball appears to be central to the meaning of this concept. One may claim that its weight is central to the notion of a basketball to a somewhat lesser degree. For example, one can imagine a statue of a basketball player holding an iron or brass basketball in his hand. This kind of a ball would be too heavy in order to be actually played with. However, one can still grant that this objection does not affect its status of being a basketball. If one were to continue such queries in one's mind, it would be possible to establish that the colour of the ball probably figures as one of the least central of all the potential properties of the basketball. All those different "perspectives" of free variation may serve the purpose of illustrating the possibility of disclosing the inherent degrees of centrality of properties throughout various concept combinations.

Consequently, it soon becomes clear that centrality is almost exclusively tested in the mind, by the process of free variation. In this particular case,

examined by Medin and Shoben, of combining adjectives and nouns it appears that there is some kind of a structure among attributes that guides reasoning by means of adjective-noun pairs:

Consider again flying whales versus flying ostriches. For *flying whale*, one must make changes to a large number of attributes. One must add some kind of wings, slim down the body considerably, and find some means of propulsion to get our redesigned whale into the air. In contrast, a *flying ostrich* requires fewer and less drastic changes. Shortening the legs and neck, for example, might very well enable this hypothetical ostrich to fly (Medin and Shoben 1988, 179).

In this example, one can see that the extent to which free variation ("making changes to attributes" in Medin and Shoben's words) establishes the level of typicality embedded in certain concepts and discloses the regularities inherent in the way certain concepts "hang together."

As I attempted to show in this chapter, inquiries into concept combinations in cognitive science revealed and thematised the importance of context and background knowledge in human cognition. The research in structured imagination disclosed the importance of known properties and background information in imagining novel entities.

However, the main goal of my chapter was to provide plausibility to the claim that in testing, analysing, and disclosing the regularities both in the context combinations and the process of structured imagination cognitive psychology employed variation quite frequently. Variation in this usage was, I suggested, a simple and easily employable device. This device was not always used explicitly in cognitive psychology. However, I claimed that it was used earlier in philosophy, although in a somewhat different manner. Following this claim I pointed to similarities and dissimilarities of the notion of variation as employed in cognitive science to the notion of free variation as employed in phenomenology.

Chapter Five

Ernst Mach: Variation and Thought Experiments

(a) Introduction

Thought experiments in natural sciences and philosophy are a matter of growing interest among philosophers of science, cognitive scientists, and philosophers of mind. Let me mention just a few: James R. Brown, Nancy Nersessian, John Norton, Roy Sorensen, and Kathleen Wilkes. The main concern of this chapter will be to show that understanding the technique of variation may prove to be quite relevant to inquiry into thought experiments. More specifically, I will show that variation figures quite prominently in the earliest modern account of thought experiments, that offered by Ernst Mach.

Let me begin by sketching several basic characteristics of thought experiments: First, they are performed in the mind in such a manner that they not only originate and are entirely executed in the "laboratory of the mind," but they also make it unnecessary to carry out the actual experiment once the

thought experiment has been completed. Indeed, in several cases, it is only possible to *imagine* the situation described by means of thought experiments. Take Einstein's chasing of a light beam: an actual experiment is in this case inconceivable. Second, thought experiments *are* indeed experiments, since our mind actively manipulates the circumstances and preparatory conditions for them. Third, they clearly have empirical relevance: once successfully established, they may open our eyes to new theoretical possibilities, making manifest empirical consequences that were not discernible in our existing representation. Finally, thought experiments may reduce to absurdity a set of assumptions and thereby refute a certain explanation or law.

Alternatively one can, with John Norton, characterize thought experiments as *arguments*. Norton claims that thought experiments in physics "provide or purport to provide us information about the physical world" (Norton, in Horowitz and Massey (ed.) 1991, 129). He goes on to infer that since *thought* experiments are not *physical* experiments, this information does not come from the reporting of new empirical data. Where does this information come from, then? Here is Norton's answer:

Thus there is only one non-controversial source from which this information can come: it is elicited from information we already have by an identifiable argument, although that argument might not be laid out in detail in the statement of the thought experiment (Norton, in Horowitz and Massey (ed.) 1991, 129).

For most commentators, a thought experiment is a mental activity which has *more* significance than merely thinking about an illustration or an interesting case study. If successful, thought experiments boast a notable level of integrity, independence, and intrinsic value. This is exemplified in the tendency of certain thought experiments to outlive the actual arguments they were devised to support or to undermine. For example, virtually any philosopher can nowadays recount the story about Schrödinger's cat, as part of the famous quantum mechanics thought experiment. But how many of these philosophers can, in fact, recount the theory behind this thought experiment?

In order to illustrate the power of thought experiments, let me present a rather convoluted and fascinating one, drawn from Albert Einstein by Roy Sorensen in his *Thought Experiments*:

Suppose a train travels six-tenths the speed of light. One observer is stationed on the middle car while a second observer stands on an embankment. Lightning bolts now strike each end of the train, leaving burn marks on the train and the ground. The light from the bolt striking the locomotive and the light from the bolt hitting the caboose reach the ground observer at the same time. Hence, the events look simultaneous to him. To be sure, the ground observer measures the distance to each of the burn marks on the ground and verifies that he was standing exactly midway between the two events. Now consider the observer on the train. Since he is travelling toward the light emanating from the locomotive and away from the light of the caboose, he sees the locomotive bolt before the caboose bolt. He, too, is situated exactly midway between the burn marks left on the train. So he infers that the bolts were not simultaneous. Who is right? Einstein amplifies the query by supposing that another bolt hits the locomotive so that it is measured as simultaneous with the caboose bolt by the train observer but as later by the ground observer. We have a number of options here. We might draw the moral that light should not be assigned a central role in our tacit definition of simultaneity. We have assumed that two distant events are simultaneous if the light emanating

from them reach their midpoint at the same time. However, Einstein urges us to stick with this aspect of the definition and instead relativize 'simultaneous' to reference frames. Thus Einstein's answer to 'Who is right about whether the bolts struck simultaneously?' is 'Bad question!'"(Sorensen 1992, 178).

Broadly speaking, there are two methods of accounting for thought experiments: empiricist and rationalist. For the former, thought experiments are just a set of problem-solving techniques. As Mach would put it, thought experiments largely utilize the *reflex motion of thought*. Their main virtue consists in their ability to reduce the time and effort required as compared to the actual performance of the experiment. In that sense, the laboratory of the mind is the cheapest experimental crash-test facility. Roy Sorensen, following Darwin and Mach, is even willing to entirely naturalize the phenomenon of thought experiments and consequently extend it to some other species; as he puts it, "People have no monopoly on abstract ideas" (Sorensen, 1992 33). The ability to perform thought experiments may be an inborn trait of many living creatures, akin to their ability to play with things.

The empiricist approach to thought experiments was stimulated by growing interest in experiments and experimentation. Thought experiments, according to this understanding, are to be considered a species of "real" experiments, although they are executed in the mind. This is evident from Sorensen's short definition of thought experiments: "A *thought experiment* is an experiment that purports to achieve its aim without the benefit of execution" (Sorensen 1992, 205).

In Sorensen's account, it seems that thought experiments owe their existence to the fruitful convergence of induction and fiction. This is the motto of his *Thought Experiments*:

I argue that thought experiments evolved from experiment through a process of attenuation. This builds inductive momentum behind the theme that thought experiments are experiments. My commitment to viewing them as limiting cases of experiment is solidified by defining thought experiments as experiments that purport to deal with their questions by contemplation of their design rather than by execution. But in the course of this analysis another reduction is endorsed: in addition to being experiments and paradoxes, thought experiments are stories. This brings one of the book's minor themes into prominence: many of the issues raised by thought experiments are prefigured in aesthetics and the logic of fiction' (6).

Rationalist understanding of thought experiments is typified by James Brown's approach. Brown stresses the fact that any successful thought experiment unfolds in the same manner in anybody's mind. Once this is accepted, we naturally seek the laws responsible for such objective phenomena. In the case of thought experiments, such laws do not depend on any new empirical data. Brown suggests that "[this] is almost true by definition; being a *thought* experiment rules out new empirical output" (Brown 1992, 77). Brown then divides thought experiments into constructive, destructive, and Platonic ones. Specifically, in the case of constructive ones, they work in the following way: "The burden of any constitutive thought experiment consists in establishing (in the imagination) the thought-experimental phenomenon. This phenomenon then acts as fairly conclusive evidence for some theory" (Brown 1992, 45). This establishing of the thought-experimental phenomenon is readily

applicable to the "constructive" and "destructive" types thought experiments; but what happens with "platonic" ones, which are the truly intriguing ones since they are simultaneously constructive and destructive?

"Platonic" thought experiments work by allowing us to grasp what Brown names "the relevant universal." Brown uses Galileo's "falling bodies" experiment, described in the introduction to my thesis, as a paradigmatic case of a platonic thought experiment. Brown claims that, in experiments like that one, science comes close to mathematics. That is, "The epistemology of thought experiments is similar to the epistemology of mathematics. Just as we sometimes perceive abstract mathematical entities, so we sometimes perceive abstract universals" (Brown 1992, 86).

Recently, philosophers of science, and particularly cognitive scientists, have made advances into the phenomenon of thought experiments, using both empiricist and rationalist strategies. Nancy Nersessian, examining the way scientists form their hypotheses, argues that a thought experiment is at first a sort of direct mental simulation. That simulation is then followed by the narrative form of presentation which serves as a guide for the construction of a structural analog of the prototypical situation described in the thought experiment (Nersessian 1992).

(b) Mach's Understanding of Thought Experiments

Mach's interest in thought experiment grew out of his fascination with a striking tendency of the human mind to manipulate its own thoughts. In simple terms, the mind does not passively reproduce the sensory impressions it receives; to use a modern analogy, it does not replay a sequence of sensory impressions in the manner in which a VCR would replay stored electronic input. On the contrary, the mind routinely alters the sequence, length, and quality of received sensory impressions. What is more, this manipulating activity does not necessarily pertain merely to the past; the mind may, apparently at will, access a vast "universe" of experiences (including not only directly acquired experiences, but also experiences mediated through other minds) and thereby set up a fictional world of future objects, events and actions.

In his theory of thought experiments, Mach came to value the importance of such activity of mental manipulation, or variation. Being a natural scientist, he considered this general tendency of the human mind with respect to a single activity -- *experimenting*. Consequently, Mach employed the term *Gedankenexperimente* to signify this tendency of the human mind.

Mach thought of nature as the inexhaustible source of abundant, wild and obscure forces, and these forces never ceased to intrigue and excite him. He insisted that all human thoughts and theories originate from nature, or, to be more specific, exclusively from sensory experience. But nature is, in Mach's opinion, too complex and dynamic a phenomenon to be encompassed by any conceptual schema: "Nature exists once only. Our schematic mental imitation

alone produces like events. Only in the mind, therefore, does the mutual dependence of certain features exist" (Mach 1943, 199). That is to say, theories exist only in the mind of the natural scientist. Yet without a source in sensory experience, there would be no theories. Looking carefully at Mach's genetic approach, it becomes clear why the patterns of thought must be homologous to the patterns of nature. By its origin and structure, thought is nothing but a lasting shadow of nature:

But man alone attains to the faculty of voluntary and conscious comparison. Man alone can, by his power of abstraction, rise, in one moment, to the comprehension of principles like the conservation of mass or the conservation of energy, and in the next observe and mark the arrangement of the iron lines in the spectrum. In thus dealing with the objects of his conceptual life, his ideas unfold and expand, like his nervous system, into a widely ramified and organically articulated tree, on which he may follow every limb to its farthest branches, and, when occasion demands, return to the trunk from which he started (Mach 1943, 231).

This does not imply that thoughts and theories in general play a secondary role for the natural scientist. On the contrary, they form the vast and inexhaustible reservoir of all past and present experiences. They contain all knowledge, whether genetically inherited, learned from sensory experiences or intuitively grasped. In that sense, there is nothing entirely new for any particular theorist to discover. Mach uses a zoological parallel to illustrate his understanding of the origin and complexity of human thought:

The animal cannot construct new members to perform every new function that circumstances and fate demand of it. On the contrary it is obliged to make use of those it already possesses. When a vertebrate animal chances into an environment where it must learn to fly or swim, an additional pair of extremities is not grown for the purpose. On the

contrary, the animal must adapt and transform a pair that it already has (Mach 1943, 229).

Given such a point of view, Mach's comments on Plato's theory of recollection come naturally: "Recalling how much in the building up of knowledge is contributed to memory, we can understand Plato's view that all inquiry and learning is remembering (from an earlier life)" (Mach 1975, 142).

All this shows that Mach believed in the biological necessity of conforming thought to fact and thoughts to each other. As well, he assumed that the very integration of thoughts and facts arises as a consequence of that biological necessity. Roy Sorensen is, to my mind, perfectly justified in starting the chapter devoted to Mach in his *Thought Experiments* by explaining how this necessity affects thought experiments. Sorensen shows that biological necessity in Mach's theory works mostly in a negative way by eliminating implausible predictions: "Rather than announcing what must happen, instinctive knowledge brutally waves off what cannot happen" (Sorensen 1992, 99). Biological necessity is therefore, according to Mach, reflected in scientific accounts of experience. Instinct should be a vital part of every scientist's sensibility. It guides a scientist, making it possible to smoothly develop his genetically inherited inclination to variation and experiment: "We can hardly doubt that there is no sharp dividing line between instinctive and thought-guided experiments" (Mach 1975, 134).

What is more, Mach believed that arguments from principle always have greater value than mere inductive procedures. First, in economic terms, they have a much lower cost of production: "Our ideas are more readily to hand than physical facts: thought experiments cost less, as it were" (Mach 1975, 136). Also, Mach preferred the scientist's pure play with principles drawn from "our own reservoir of ideas" over the blind collecting of data. As Paul Feyerabend pointed out in his paper on Mach and Einstein, Mach held that "The adaptation of facts and ideas 'can proceed in many *different* ways.' Idealizations arising from different areas or from different principles in the same domain occasionally clash and give rise to paradoxes" (Feyerabend 1984, 9).

According to Feyerabend's view of Mach's position, thought must conform to sense sequences, but can do so in different ways. Just how this conformity comes about cannot be explained or determined by thought itself. This comes as no surprise because thoughts are (as we have seen, in Mach's opinion) just adapted reflections of the sense sequences. That is why Feyerabend claims that Mach's physical arguments are carried out while Mach completely ignores the epistemological argumentation. In other words, thinking about experiences is just an extended pattern of these very experiences. For example, the following phenomenon is simply a physical fact for Mach: "The stone we hold in our hand, when dropped not only falls to the ground in reality, it also falls in our thoughts" (Mach 1943, 220). The problem with this position, as Feyerabend points out, is that: "There exists no stage in history, or in growth of the individual that

corresponds to the 'first stage'; there is no stage when, surrounded by 'a labyrinth of sense impressions' we 'mentally and arbitrarily' select special bundles of experience, 'freely create' concepts and correlate the concepts with the bundles" (Feyerabend 1984, 12). This interpretation makes Mach appear to be an anti-foundationalist, since he simply assumed the existence of both experience and instinct and did not explicitly attempt to correlate them with the fundamental epistemic concerns.

Sorensen rightly points to the excesses that followed from Mach's postulation of instinctive knowledge and his attempt to support the claim that instinctive knowledge can be converted to explicit scientific principles by thought experiments. The role of thought experiments in this respect is best described as one of "filtering". Instinct, being "hard wired" into the human brain, is always an echo of past primitive myths and rituals. It preserves within itself a certain amount of magic and the task of the scientist is to convert that obscure intuition into explicit knowledge. This whole idea shows Mach's admiration for Darwin. But it also shows that Mach developed a somewhat simple social Darwinian concept of the organism's passing on traits to its offspring. Based upon that concept, some untenable claims are drawn, such as the claim that children inherit technological techniques.

Upon a closer look, all the basic concepts of the Darwinian theory of evolution can be found in Mach: *adaptation* of thoughts to nature and to each other, *sustaining* of the already existing elements throughout the process of

adaptation and adjustment, *varying* the circumstances of the *environment* in order to see how this change will affect the "*thought organism*," etc. On Mach's view, variation leads to a process of *mental selection*:

By varying the conditions (continuously if possible), the scope of ideas (expectations) tied to them is extended: by modifying and specializing the conditions we modify and specialize the ideas, making them more determinate, and the two processes alternate (Mach 1975, 139).

The ideas (expectations) create conditions and conversely the conditions create ideas. All this serves the purpose of further reconstruction of more complex facts in terms of their combinations. Sometimes, the process of variation may reduce to absurdity a particular set of antecedent ideas. (As Mach pointed out, such examples as Galileo or Stevin are landmarks in the natural sciences). The new, adapted set of ideas is then integrated into a general physical concept or law.

In any case, Mach has been given credit for coining the term *Gedankenexperiment*, and he has equally been praised for his account of the most important traits of thought experiments. According to Mach, thought experiments are ranked higher on the evolutionary ladder, and are even theoretically "stronger," than physical experiments. First, they eliminate superfluous and extraneous variables. Second, they attenuate our own subjective interpretation. As scientists performing thought experiments, we rely on that immense reservoir of past human experiences which necessarily conforms to nature in some way. Nonetheless, thought experiments may be used wrongly and may be used with more or less skill. This is where the heuristic

aspect of Mach's treatment of thought experiments comes into play. By using thought experiments, the student will learn to separate the sort of "guesswork" which yields useful results from that which does not.

Mach was well aware of the immense force that habitual thinking imposes upon human life. He employed the suggestive analogy of a piano player who always has to follow some preset sequences, even while improvising, in order to play properly: "Like a piano-player with previously prepared sounds, a speaker excites in his listener thoughts previously prepared, but fitting many cases, which respond to the speaker's summons with alacrity and little effort" (Mach 1942, 192). This "habitual thinking" is a somewhat mysterious topic, yet it is of undoubtable philosophical relevance. Unfortunately, however, this relevance has always been inversely proportional to the clarity with which the idea of "habitual thinking" is expressed in philosophical accounts trying to reach an understanding of it. For Mach, this phenomenon represented a necessity and a danger at the same time:

Physically, no one could exist, if he had to guide and regulate the circulation, respiration and digestion of his body by conscious and purposive acts. So, too, no one could exist intellectually if he had to form judgments on every passing experience, instead of allowing himself to be controlled by the judgments he has already formed. Prejudice is a sort of reflex motion in the province of intelligence (Mach 1943, 232).

This is where it becomes clear that Mach's idea of thought experiments is extended too far in one sense and is too vague and limited in another. It is simply not correct to equate "a thought experiment" with "an experiment which

is planned and executed in thought". To say, for example, that imagining a piece of litmus paper immersed in acid would also involve imagining change of its colour is not to engage in a thought experiment. The latter case only succeeds in coming very close to thought experiments by virtue of disclosing a natural law or regularity by mere thinking.

Strictly speaking, even physical, operational experiments are, in some sense, planned and executed in thought before coming to the laboratory. It is relatively easy to understand how the difficult and often unpredictable engineering problems of the actual scientific experiment unfold effortlessly in a scientist's mind. Given this, how are we to judge when thought experiments stop and "real" experiments start? What really does happen in the laboratory? How can a product of a natural scientist's guessing (which was, in Mach's mind, a perfectly acceptable scientific procedure) be distinguished from scientific discoveries that originate by pure chance or, for example, by misuse of certain elements in a previously set scientific experiment? In other words, why claim that scientists experiment in their minds when so many elements of scientific experimentation involve the chaos and unpredictability of nature?

What Mach has in mind when talking about thought experiments in most cases stands much closer to something that can be termed a "trial and error test" or, better, a specialist's or student's "short hand thought probe", something closely related to problem-solving techniques. But one of the problems with such an approach is that there are some domains of human thought where theoretical

enquiry starts and ends with such probes and never directly touches upon "sensory experience." For example, if we define thought experiments as widely as Mach, certain aspects of ethics could simply be taught as ethical thought experiments. These experiments usually take the laws of nature and sensory experience to be entirely irrelevant to the case they want to prove.

Furthermore, what happens not only to ethical thought experiments but also to "pure" fantasy, dreaming, meditation, story telling and hallucination? This objection is, I believe rightly, made by Sorensen. Here, Mach's principle of thought conforming to nature turns out to be highly questionable (or else one would have to defend the claim that ethical theories may be read from the physical patterns of the Earth or from instinctive animal behaviour). In order to defend his position, Mach would either have to disallow non-scientific thought experiments from his theory, or admit that there are many phenomena in human intellectual history that have not resulted from practical problem solving.

(c) Variation and Thought Experimentation

The ability to *vary* the content of one's thoughts is seen by Mach as the principal requirement for thought experimentation. This is how Mach characterizes the basic method of both thought experiments and physical experiments, that of variation:

As we see, the basic method of thought experiments, as with physical experiments, is that of variation. By varying the conditions (continuously if possible), the scope of ideas (expectations) tied to them is extended: by modifying and specializing the conditions we modify and specialize the ideas, making them more determinate, and the two processes alternate (Mach 1975, 139).

Although varying occurs in one's imagination, the process of variation is not unrestrained. Mach warns that the natural scientist's activity "of variously combining conditions" (Mach 1975, 137) differs from free fiction -- the former activity is conditioned, most thoroughly, by reality. In other words, the experimenters are compelled always to turn their thoughts towards reality. Since the thought usually contains less than experience, i.e. the thought is a mere schematic presentation of reality, even the simplest thought of the experimenter does not coincide entirely with reality. However, this does not prevent one to learn "[how] accurately experiences are represented by thoughts and how far the latter agree with each other" (Mach 1975, 137). This exercise in "intellectual transformation of the contents of experience" is not just an idle game of mimicking nature. On the contrary, the process of varying one's thoughts is a powerful cognitive tool in piecing together a coherent picture of reality:

What will determine success, what hangs together and what is independent, all this becomes much clearer through such a survey than it could become through individual experiences. This makes it plain to us how we can combine convenience with the need to do justice to experience, what are the simplest thoughts that can be most comprehensively squared with each other and with experience. We achieve this by varying the facts in thought (Mach 1975, 137).

There are numerous strategies which can be employed in the process of mental variation. The most illustrative one is the strategy of gradually increasing or decreasing particular elements of the initial setting of thought experiments. Mach stressed that this strategy often diminishes to zero certain conditions which qualitatively affect the result. Consequently, the remaining factors become much more perceivable; as it were, by the mental "pop out" effect:

An important process consists in mentally diminishing to zero one or several conditions that qualitatively affect the result, so that the remaining factors alone must be taken as of influence. Physically, such a process is often impossible to carry out, so that we may speak of it as an idealization or abstraction (Mach 1975, 140).

Gradual variation of this sort may affect the various properties of the objects and phenomena presented in thought experiments, such as: speed, weight, angle, and temperature.

In *Knowledge and Error* Mach uses the example of the law of inertia: he points out that thought experiments, made possible by continuous variation, have led to discovery of this law. However, in order to discover the law of inertia one needs to understand an idea of uniform movement. How do we reach the idea of a body moving uniformly without resistance when a case like that does not square with our past experiences? We need to give up the expectations that this case can be realized in reality: instead we resort to mental variation. We first consider the retardation of a body moving up a very slightly inclined plane. We vary the angle of this plane until it becomes vanishingly small. Second, we consider the resistance to motion of a body impelled on a horizontal plane. We

vary the elements of this resistance (friction, air, etc.) until they become vanishingly small. Finally, we form the idea of a body moving uniformly without resistance.

Another, more informal, example of this kind of variation involves answering the following question: Why we get more rain on the windshield when the car is moving than when it's stationary? Consider a thought experiment published recently in the *Globe and Mail*:

Imagine for a minute that the rain is falling very slowly, so slowly that it stands still, like a flat mist. You would get no rain at all on a stationary windshield. Start to drive through this hovering rain, and the windshield will start to get wet. Double your driving speed, and you will collide with twice as many raindrops in as given time -- your windshield will get twice as wet (The *Globe and Mail*, Thursday, June 1, 1995, Section A13).

The ability to vary, in one's imagination, both the speed at which the rain is falling and the speed of the car is a central feature of this thought experiment. It then becomes very easy to explain that we get rain on our windshields for two reasons: it falls on us and we drive into it. One infers from the latter that we get more rain on the windshield when the car is moving.

Yet another example of this sort is the question: When a hubcap falls off a car, why does it accelerate ahead of the vehicle for a short distance? In order to answer this, one has to imagine holding a disc in one's hand, spinning it and dropping it to the floor. For example, one could imagine doing this in a stationary car, leaning out the window and dropping the spinning wheel on the

ground. As soon as it hits the ground the disc will shoot off in the direction it's spinning. This is what happens at the second stage of this thought experiment:

Now imagine that you are in a car leaning out the window with that same spinning disc in your hands. The car, you and the disc are all moving forward with the same velocity. When you drop the spinning disc it will hit the ground right beside you because it is still moving forward with that same velocity. If the disc, like a hubcap, has forward spin on it, it will temporarily accelerate away from you (*The Globe and Mail* Thursday, July 6, 1995, Section A11).

The technique of variation, in this case, helps understand why a hubcap accelerates ahead of the vehicle when it falls off. The phenomenon that was supposed to be explained involves two types of movement: the forward movement of the car and the rotational movement of the hubcap. It was much easier to understand how the two movements get compounded in the case of the hubcap if one gradually reduced (using the technique of variation) the speed of the car to zero, while keeping the rotational movement constant.

(d) Conclusion

As I have suggested in this chapter, Mach saw the process of varying one's thoughts as a basis for thought experimenting in natural sciences. What I would like to suggest in closing is that this understanding of variation may also be relevant to the contemporary thought experiments debate.

Most importantly, Mach's understanding of variation provides a significant criterion for evaluating thought experiments -- coherence. One can

argue that thought experiments which employ Mach's variation of thoughts fare much better on the coherence scale than many other kinds of thought experiments. The main reason for this is the fact that, with variation, one is obliged always to make additional adjustments to maintain the coherence of the "new" (and somewhat altered) picture of the world one is offering. In order to illustrate this, I will borrow an example from Galileo, the true master of variation based thought experiments. Galileo explained that imagining an animal increased in proportion in all dimensions, and preserving geometrical similarity, also requires significant changes made to the structure of that creature's bones. In any other case, that creature would collapse under its weight.

Alternatively, in the manner quite common in contemporary philosophy, one might begin a thought experiment by supposing that one has one or several identical twin brothers or that there might be one or several identical Twin Earths. The problem with this thought experimentation is that it seems not to require any concrete adjustments in order to maintain a coherent picture of the world. Even worse, there seems to be no great difference in saying that there might exist hundreds or thousands of Twin Earths if one allows the possibility of *one* Twin Earth.

Kathleen Wilkes, in her book *Real People*, has addressed numerous problems with what she calls "fantastical" philosophical thought experiments. She lists several examples of the latter kind of thought experiments and points

that their structure appears perniciously open-ended. But their loose structure is not Wilkes's concern. She points out that their most serious flaw is the fact that they do not help to disclose any salient properties of the real world. Instead, they offer conclusions which apply largely to counterfactual, "fantastical" worlds.

For example, one test suggested to discover certain fundamental traits of morality is to ask "[w]hat if we all had a Gyges' ring to make us invisible at will?" (Wilkes 1988, 5). We proceed imagining a possible world in which people may turn invisible. Given that in such circumstances nobody would remain moral it looks as though morality is based rather on self-interest than on something grander. "The imaginary state of affairs is the invisibility, one conclusion *may* be that morality must be based ultimately on self-interest" (Wilkes 1988, 5).

Wilkes goes on to list several typical examples of "fantastical" thought experiments, which seem to have mushroomed in philosophy, and particularly in moral philosophy:

There are statues that come to life (today, more commonly, we tend rather to postulate robots with many or most of our distinctively human characteristics); non-human animals with human intelligence; people who split like amoebae or fuse like clouds; brain transplants, mind transplants (i.e. wiping the "program" out of the hardware of one brain and programming a "blank" brain with it); transplants of the left and right hemispheres of the brain into two different bodies; and so on and so forth (Wilkes 1988, 6).

The main weakness of this kind of thought experiments is lack of their relevance to reality. The scientific thought experiments, in contrast, take place in a carefully designed, experimental context. Their role is:

to fix the *ceteris paribus/absentibus* conditions that surround *any* attempt to generalize from one sort of thing to another. To repeat: as far as is practically possible, the experimental set-up operates to identify all the potentially relevant factors, and then to exclude certain variables completely, and to hold other fixed (Wilkes 1988, 45).

Wilkes concludes that we are taken too far from the actual world by the "fantastical" thought experiments: they do not attempt to identify, restrict, or fix the *ceteris paribus* conditions. One of the major faults of this kind of thought experiments is that they do not make it clear which kind of *variation* was involved, and what was the extent of that process of variation: "This means that we are left with no clue as to what has been varied in thought and what left (supposedly) untouched" (Wilkes 1998, 45).

Moreover, the "fantastical" thought experiments force us to abandon the hope of making them relevant to the actual world. They are fine as fantasies, as "mere" works of fiction; as such, they are quite fun to read. But, they do not allow for philosophical conclusions to be drawn, because in a world indeterminately different we do not know what we would want to say about anything.

Following Mach's and Wilkes's understanding of thought experiments, it seems indeed that many poorly structured thought experiments do not involve continuous variation (at least implicitly). However, it would be quite hasty to

conclude from this that variation provides a necessary and sufficient condition for good thought experiments.

Consider, for example, Stevin's thought experiment concerning the properties of an inclined plane. The imaginary state of affairs is of two perfectly frictionless planes joined at an angle so that there is one steep, and one less steep incline down. Would a chain draped over such a plane remain put, or would gravity pull it down one side or the other? The answer is obvious the moment one makes the chain circular (joining the two ends under each bottom edge of the planes); for, if it is to slide at all, it would evidently have to slide for ever. Given that there are no perpetual motion machines, the chain in the original thought experiment would have to remain in equilibrium.

This thought experiment, which makes a perfectly reasonable case concerning the laws of mechanics, does not seem to involve variation.

Instead of saying that variation is a necessary and sufficient condition for good thought experiments, I will conclude that variation has an important role to play in thought experimentation. The technique of variation, when employed properly, helps produce "realistic" thought experiments which are capable of disclosing certain features and properties of the real world.

Conclusion

(a) Mental Activity in General

Bruce Aune's entry "Thinking" in *The Encyclopedia of Philosophy* divides thinking, following Aristotle, into two categories: *contemplation* and *deliberation*. Contemplation, when successful, terminates in a conclusion. Successful deliberation, in contrast, terminates in a decision. This division was largely responsible for dividing reasoning into theoretical and practical, although day-by-day reasoning seems to be an untidy mixture of both these basic forms.

Aune adds that thinking, less generally, is commonly understood as a largely covert activity, i.e. taking place in one's mind. As well, thinking is conceived as "intentional" in Brentano's sense of "being directed towards an object."

Theories of cognitive activities have generally been variants of one or more of the prevalent philosophical views: thinking has been conceived as a dialogue of the soul, a spiritual activity of recollecting Forms, an act by means of which essences of things are shared by the human mind, an activity of bringing

concepts or ideas before the mind, a "habitual" activity of invoking images or moving from one image to another, or merely the overt activity of speaking thoughtfully.

One can see, from this sketchy list, that quite distinct metaphors, such as "speaking," "recollecting," "invoking," etc., served as the basis for capturing the nature of cognitive activities. There was little overall agreement on describing the basic activities of the human mind. I will present two rival "traditions," influential schools of thought, to illustrate this lack of agreement on the nature of mental activity. The first tradition might be called *Aristotelian*, represented here by Aristotle, Drummond, and Brentano. The second might be called *empiricist*, represented by Locke, Berkeley, and Hume.

In broad terms, Aristotle's *Categories*, *De Interpretatione* and *Prior Analytics* deal with representing, judging, and inferring respectively. Aristotle held that "A sentence is a significant portion of speech, some parts of which have an independent meaning, that is to say, as an utterance, though not as the expression of any positive judgment" (Aristotle *De Interpretatione*, 16b).

Aristotle contrasted the mere act of understanding or uttering of *sentences* which is neither true nor false, saying a prayer for example, with understanding or producing *propositions* which are endowed with either truth or falsity. Thus the act of grasping sentences, or meaningful and grammatical clusters of words

(representing), is contrasted with the act of either affirming or denying something about something (judging).

Inferring was the third kind of cognitive, or better discursive, activity in Aristotle. Inferring was described in terms of syllogistic inference:

A syllogism is discourse in which, certain things being stated, something other than what is stated follows of necessity from their being so. I mean by the last phrase that they produce the consequence, and by this, that no further term is required from without in order to make the consequence necessary (Aristotle *Analytica Priora*, 24b).

The Aristotelian tradition was sustained by many generations of logic textbooks and scholarly tracts. Consider, for example, Drummond's logic textbook (1723) and Reid's treatise on the Intellectual Powers (1785). Emily Michael recently translated a passage from a student dictate made for Drummond's 1723 logic course at Edinburgh. This passage lists three distinct operations of the mind -- apprehension, judgment, and discursive reasoning:

Apprehension is the naked mental representation of something without affirming or denying, as when we consider the sun, or anything else you may wish....but only by contemplating and as if by intuiting.
 Judgment is the assertion of the mind about its own ideas compared among themselves, as when the mind compares the earth with the idea of round and either affirms or denies that the earth is round.
 Discursive reasoning is the operation of the mind by which we elicit one judgment from another, as when we judge that which is best is above all things, loving God is the best, and hence we infer that loving God is above all things. (Proemium, 3-5 *Institutiones Logicae*, from a presentation of Emily Michael, University of Western Ontario, May 20, 1995).

Thomas Reid examined the Aristotelian understanding of the intellectual powers and noted that the classical division of the intellectual powers into simple apprehension, judgment, and reasoning had received a very general

reception and the authority of antiquity. But he stressed that these three activities are not independent of each other; without apprehension of the object there can be no judgment, as little can there be reasoning without both apprehension and judgment. Reid further pointed out that this division of the intellectual powers corresponds to the traditional understanding of successive steps by which the mind proceeds in the acquisition of its knowledge. First, there are senses which furnish the mind with simple apprehension, notions of ideas. Second, the mind compares its ideas, and by perceiving their agreements and disagreements, it forms its judgments. Third, from two or more judgments, the mind deduces conclusion of reasoning (Reid 1971, 69).

This classical picture of the human intellectual powers was revived in Brentano's account of the elementary cognitive activities. Brentano proposed the following three cognitive activities as basic -- referring, affirming, and valuing:

To state our view at the outset, we, too, maintain that three main classes of mental phenomena must be distinguished, and distinguished according to the different ways in which they refer to their content. But my three classes are not the same as those which are usually proposed. In the absence of more appropriate expressions, we designate the first by the term "presentation," the second by the term "judgement," and the third by the terms "emotion," "interest," or "love" (Brentano 1973, 197-198).

Brentano thus collapsed the second and third acts, inferring becoming a special case of affirming. This way of characterizing cognitive activities is also the expression of a traditional philosophers' desire to discover some fundamental

and simple operations of the mind to which all other operations can be reduced.

In Brentano's words:

Among the investigations having primary and universal importance we must include the investigation of the ultimate mental elements out of which more complex phenomena arise (Brentano 1973, 45).

Locke, Berkeley, Hume and others had different ideas regarding activities of the human mind.¹³ Locke was the first to offer the "dark chamber" as an analogy for the human mind,

For, methinks, the understanding is not much unlike a closet wholly shut from light, with only some little openings left, to let in external visible resemblances, or ideas of things without: would the pictures coming into such a dark room but stay there, and lie so orderly as to be found upon occasion, it would very much resemble the understanding of a man, in reference to all objects of sight, and the ideas of them (Locke *Essay*, 2.11.17.).

This particular aspect of Locke's understanding of cognition makes the mind appear as a mere "container" of sense impressions, but this is not the whole story. In fact, Locke painted a picture of an active human mind in his *Essay*. Most importantly, and in sharp contrast to Aristotelian understanding of human cognition, Locke's account of cognition introduced *images* and their impression in the mind. In Aristotle "phantasmata" are merely epiphenomenal accompaniments of mental activity. Locke spoke about the understanding in

¹³ Perhaps one should note that, when it comes to discussing mental activities, and particularly to justifying one's belief, vision is typically given the lion's share of authority and responsibility. Other sources of perception (tactile, auditory, etc.) appear to merely "reaffirm," or "enhance" the findings which would normally be observed visually. There is a huge number of ordinary language expressions which can be used to illustrate this point. For example, it is said that someone is "in the dark" if one doesn't understand something. By contrast, if things are clarified and properly accounted for, one typically claims that the "light was shed" on things or that "things are seen in proper perspective."

terms of incoming *pictures* which lay their patterns on the mind much in the way shadows are cast on the barren land.

Besides receiving these simple and vivid impressions, the Lockean mind is constantly engaged in manipulating, associating, and mixing them and appears able to split and blend various parts and aspects of them. The repeated and systematic exercise of these activities, I suggest in chapter one, eventually leads to variation.

Berkeley, following Locke, explained that the mind either *receives* ideas as imprinted on the senses or *perceives* them by *attending* to its own passions and operations. In his *Principles*, Berkeley lists compounding, dividing, and representing as the primary activities, rather than representing, judging, and inferring, which enable the mind to form complex from simple ideas by help of memory and imagination. The mind is distinct from the ideas it perceives -- the existence of the ideas consists in being perceived, while the existence of the mind consists in exerting diverse operations, i.e. willing, imagining, and remembering.

Berkeley further believed that there were no general ideas. Instead, the mind forms ideas of *things* by associating various sense impressions:

Smelling furnishes me with odours; the palate with tastes, and hearing conveys sounds to the mind in all their variety of tone and composition. And as several of these are observed to accompany each other, they come to be marked by one name, and so to be reputed as one thing (Berkeley *Principles*, 41).

This kind of association is designed in direct opposition to the traditional procedure of hypostatizing of abstract ideas.

Hume was the most vocal critic of the traditional account of the understanding:

We may here take occasion to observe a very remarkable error, which being frequently inculcated in the schools, has become a kind of establish'd maxim, and is universally received by all logicians. This error consists in the vulgar division of the acts of the understanding, into *conception*, *judgment*, and *reasoning*, and in the definition we give of them (Hume *Treatise*, 96).

He pointed out that conception had been described as the simple survey of one or more ideas; judgment as the activity of separating or uniting of different ideas; and reasoning as the separating or uniting of different ideas by the interposition of others, which show the relation they bear to each other. He proposed, instead, that acts of the mind be seen as nothing but simple *conception*¹⁴. When we infer a cause from its effect, we infer it immediately; and this kind of inference is the strongest of all species of reasoning. An opinion, or belief, is thus described as "A lively idea related to or associated with a present impression" (Hume *Treatise*, 96). The human reasoning is guided by *custom* or a principle of *association*; only custom and association determine the passage from the impression of one object to the idea or belief of another object. However, belief is something more than a simple idea -- it is a manner of forming an idea.

¹⁴ Hume's *conception* is, of course, not a "simple survey of ideas." It always precedes the understanding; where conception fails the understanding must also fail (*Treatise*, 164).

Variation, as applied to simple ideas, provided Hume with a good analogy to make his point regarding belief:

And as the same idea can only be vary'd by a variation of its degrees of force and vivacity; it follows upon the whole, that belief is a lively idea produc'd by a relation to a present impression, according to the foregoing definition (Hume *Treatise*, 97).

I intended this sketch of two opposing traditions in describing mental activities to serve as an illustrative, rather than exhaustive, depiction of the ancient desire to unravel the secrets of mental activity. There have been several other interesting conceptions of what goes on in the mind, of which *apperception* deserves to be mentioned.

Apperception is usually defined as the mental process which raises subconscious or indistinct impressions to the level of attention and at the same time arranges them into a coherent intellectual order. One has to note that this term has been used ambiguously, sometimes to mean consciousness or awareness, at other times assimilation or simply attention.

Kant's understanding of mental activities has been significantly influenced by the constant presence of the "I that thinks" in all acts of thinking. Kant made use of diverse acts of the mind: "understanding," "apperceiving," "judging," and "synthesizing." He also used the term mental "spontaneity"¹⁵ when referring to thinking. In particular, he distinguished between empirical

¹⁵ Cf. Robert B. Pippin, "Kant on the Spontaneity of Mind," *Canadian Journal of Philosophy*, Volume 17, No. 2, 1987.

apperception (the person's awareness of oneself, dependent on the changing conditions of one's consciousness) and transcendental apperception, or "pure reason," inner, unchangeable consciousness. The latter is constituting the "transcendental" unity of consciousness which precedes all data of perception and makes possible their inner order and meaning.

Herbart's understanding of apperception differed from Kant's in his attempt to provide an empirical interpretation of the transcendentalist position. Herbart held that the gift of apperception is one of the qualities that distinguish man from animal because it gives him the power of reflection. In the human soul, there are series of presentations, combinations, and whole masses of perceptions which are sometimes completely and sometimes incompletely interwoven. They in part conform to each other and in part oppose each other. It is the function of apperception, according to Herbart, to assimilate the various and often divergent ideas. Thus the older apperceptive mass, consisting of concepts, judgments, etc. will tend to assimilate more recent and less settled impressions.

Recent advances in epistemology work with less broad categories and pay more attention to various types, forms and nuances of mental activities. Alvin Goldman's *Epistemology and Cognition*, for example, conscious of recent important developments in cognitive science, boasts a rich vocabulary of cognitive activities: abstracting, matching, calibrating, computing, representing, retrieving from memory, structuring, perceiving, imagining, inferring,

processing information, concept forming, producing memory, reconstructing in memory, transforming, and unit information processing. This list suggests that cognitive science takes the minute and diverse activities of the human mind much more seriously than the traditional epistemologies.

(b) Variation as a Special Kind of Mental Activity

I would like to contrast these accounts with mental variation, keeping in mind one fundamental trait of variation: I suggest that variation involves more active intervention into the content of one's thoughts than most other cognitive processes which are, by their nature, more receptive, i.e. passive. This applies particularly to the "traditional" philosophical understanding of human cognitive activities.

Variation involves activities analogous to replacing, rearranging, and altering objects and ideas and their parts. All of those procedures are by their nature active, resembling the practical and attentive encounter with the objects and phenomena which occur in the physical world. Consequently, variation has much of the flavour of trial and error problem solving techniques. Varying things and ideas in one's mind may be seen as analogous to doing things with one's hands, for example.

One might find this approach too simplistic to discover any interesting properties of the human mind and consequently reject the proposed inquiry into

variation as trivial. However, one is often reminded that there is nothing wrong with employing simple analogies in attempting to learn about the nature of things. As Ian Hacking pointed out in *Representing and Intervening*, philosophers typically tell fables in order to teach philosophical lessons. A glance at history of philosophy suffices to convince one that philosophers, to a large extent, have always been story tellers. Bringing variation into philosophy should not, therefore, be seen as something new and controversial. Moreover, there are reasons to believe that simple cognitive techniques, such as variation, should be welcome in philosophy. They are capable of revealing, both intentionally and inadvertently, interesting properties of the human mind, and even more importantly, of the essences of things. In Hacking's own words: "There may be more truth in the *a priori* fantasy about the human mind than in the supposedly disinterested observations and mathematical model-building of cognitive science" (Hacking 1983, 131).

On the surface, the activity of variation may indeed appear too basic, primitive, and philosophically uninteresting to deserve serious scrutiny. However, this simplicity may be deceiving because the level of complexity associated with variation depends partly on the examples which are chosen to represent it.

Let me illustrate the technique of variation by making two points. First, variation can be described in quite simple terms: *varying*, in one's mind, *some aspects* or elements of a compound structure, *while keeping some other aspects or*

elements of that structure constant. This kind of variation, more empirical in its nature, may be attributed to Ernst Mach.

Thus, for example, fashion designers might vary in their minds the styles, colours, length, and fabrics of a shirt in order to create a new shirt style. They would, in that case, hold constant in their mind that they are dealing with a shirt, varying some or all of the accidents that may potentially be attached to it. Instead of the shirts, they might think in terms of "casual evening wear." In this case, our designers would be holding constant in their mind that they are dealing with "casual evening wear." Consequently, the different clothing items such as shirts, t-shirts, blouses, for example, will be varied as potentially fitting the particular "casual evening wear" style.

Certain procedures employed in thought experiments may be perceived as this kind of variation. Take, for example, the famous thought experiment designed by Galileo. Galileo set out to prove that all bodies fall at the same speed regardless of their weight. First he noted Aristotle's view that heavier bodies fall faster than light ones ($H > L$). This is what happened afterwards:

We are then asked to imagine that a heavy cannon ball is attached to a light musket ball. What would happen if they were released together? Reasoning in the Aristotelian manner leads to an absurd conclusion. First, the light ball will slow up the heavy one (acting as a kind of drag), so the speed of the combined system would be slower than the speed of the heavy ball falling alone ($H > H+L$). On the other hand, the combined system is heavier than the heavy ball alone, so it would fall faster ($H+L > H$). We now have the absurd consequence that the heavy ball is both faster and slower than the even heavier combined system. Thus, the Aristotelian theory of falling bodies is destroyed. But the question remains, "Which falls fastest?" The right answer is plain as day. The

paradox is resolved by making them equal; they all fall at the same speed ($H = L = H+L$) (Brown 1991, 1-2).

Arguably, one of the cognitive activities involved in the performance of this thought experiment is variation. One may test the falling speed of both objects by varying, in one's mind, the length of the string used to attach the light ball to the heavy one. One may start with a reasonably lengthy string (imagining the light ball as a drag) and vary its length until it becomes infinitely short (and makes the two balls into one object). The ability to vary; i.e. shortening the length of that imagined string freely and as many times as possible is an essential requirement of this thought experiment (Galileo 1974).

Second, variation might be used in much more abstract and tacit manner. Understood in this sense, variation involves a subtle *shift in one's thought*, comparable to a gestalt shift, which enables one to test various essential properties and regularities of certain abstract phenomena (tones, for example). This kind of variation was first discovered by Edmund Husserl. It plays an important role, for example, in the analysis of Twardowski's general concepts.

There are certain kinds of general presentation, i.e. indirect presentations, which require other presentations (the auxiliary presentations) in order to be awakened. This was first discovered by Bolzano. In paragraph 63 of his *Theory of Science*, Bolzano showed that if an object falls under a complex idea, then it is not necessarily, or even normally, the case that the parts (constituents) of the complex idea designate parts of that object. He gives as

examples: "A land without mountains" and "The eye of the man." If one holds that an idea of an object should have a certain agreement with an object, then one would expect mountains to be a part of a mountainless land and the whole man to be a part of his eye.

Since the latter is not possible, Twardowski later inferred that when it comes to names which are intended as indirect presentations, we find that they are called up through the auxiliary presentations. From Bolzano's examples it also follows that the structure of individual presentations is not necessarily replicated in general presentations, although it has been quite common to assume this. Aristotle, for example, had said that in sensual knowledge the sense contains the sensual object without its matter. Kant held that there can be no knowledge without a blend of concept and intuition.

Barry Smith gives the following account of Twardowski's general presentations. He begins by stating what general presentations are *not* for Twardowski:

General presentations are not, Twardowski argues, to be understood by relating concepts or other immanent *entia rationis*, and nor are they to be understood as presentations of a set or list of individual objects falling under the relevant concept (as if a general presentation were some sort of summation of a number of individual presentations) (Smith 1994, 162).

This is highlighted by the fact that we can, with the aid of a general presentation, make judgments which accomplish more than the individual judgments in their totality. Twardowski maintains, instead, that general presentations refer to a special kind of object -- *general objects*. In other words,

general presentations refer to what results when those marks of features common to all the objects of the relevant individual presentation are ordered and combined in presentation in such a way that they are unified as a whole. The general lion, for example, shares with any particular lion the features common to all lions.

This is how Twardowski characterized general presentations: "What is presented through a general presentation is a group of constituents which are common to several objects. This group of constituents is presented as a whole that belongs together; this is the object of the general presentation" (Twardowski 1977, 100).

The object of the general presentation, however, should not be confused with the object of the individual presentation. This is particularly difficult because general presentations depend on individual presentations. Whoever conceives of man in general cannot do so (unless this presentation is merely symbolic) without conceiving of an individual man. In this case, presentations of judgments play the role of *mediating* between the presentation of the individual man and that of man in general. In contrast to Bolzano's indirect presentations, this would be an example of *direct* mediation between the individual and general.

The direct presentations, as well as indirect ones like "the eye of the man," are therefore made possible by the arbitrarily chosen individual presentations. Those individual presentations, serving as auxiliary

presentations in forming the general ones, are by no means different from "normal" individual presentations. The only difference lies in the *mode* of in which they are presented: they become *representative* of the general idea.

In order to understand how it happens that several individual presentations may represent the same general idea and that several general ideas may be represented by a single individual presentation, one needs to think in terms of variation.

On the one hand, one can take a particular presentation of a human eye to represent several general presentations: "an animal's eye," "a human organ," "an eye-like shape" etc. When one actually looks at a human eye in this manner, one is not simply perceiving it. Instead one becomes aware of the possibility of varying general presentations and keeping the particular presentation constant. In simple words, one might ask: "What all can a human eye stand for?"

On the other hand, one can take any number of particular presentations of the human eye to represent the single general presentation, e.g. "the eye of the human being." In reality, one is perceiving a constant individual presentation, but is aware of how it might be varied, i.e. how particular exemplars of the "human eye" may differ in colour, shape, etc. In the latter case, one is capable of varying particular presentations and keeping the general presentation constant.

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