MEINONG ON PSYCHOPHYSICAL MEASUREMENT

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1. Introduction

Meinong's Slovene pupil Franc Veber[1] argues in his *System of Philosophy* [Veber 1921] that Meinong's Theory of Objects starts in the booklet *On the Meaning of Weber's Law, Contributions to the Psychology of Comparing and Measuring* [Meinong 1896]. This paper traces the origins of the theory of objects which may be found in Meinong's theory of measurement, particularly in the concept of diversity (*Verschiedenheit*).

2. Franc Veber and Meinong

Franc Veber was a young student of theology in Maribor, Slovenia, which is very close to Graz, when he wrote to Meinong. Meinong accepted him as his student and also provided money for the papers that Veber wrote under his supervision. Veber always thought that the extension of the theory of objects to the special objects of volitions or dignitativa was his main contribution to Meinong's work, so that these actively supported objects in the area of emotions correspond to the position of judgements in the area of cognitions. There thus exists a natural basis for ethics in experiences and in their corresponding objects.

Meinong wanted Franc Veber to be his assistant in Graz. But in the year 1919 Veber went to Ljubljana, Slovenia, to teach at the new established university there, Meinong was unhappy but showed understanding. He decided to give his private library to Veber and this library is now at Ljubljana University, in the Department of Philosophy.

Franc Veber's first idea after his arrival in Ljubljana was to establish a Meinongian school. This is apparent in the book *System of Philosophy* [Veber 1921], which is partially discussed here. Eventually, Veber started to develop his own philosophy, his efforts culminating in the book *Quest for Reality*

[1] Franc Veber, Meinong's pupil, is the most important Slovene philosopher. His books, written mostly in the 1920s and 30s, include *Analytical Psychology, An Outline of Psychology, System of Philosophy, Ethics, There is a God, The Quest of Reality.* Although he used the name Weber at the beginning and at the end of his career, in this paper the Slovene spelling of his name Veber will be used. Thus the name Weber will be reserved for the discoverer of the psychophysical law.

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[Veber 1939] in which he claims to have discovered a special manner of grasping reality opposed to Meinong's presentation-bound theory. For this reason, sensations, particularly sensations of touch, moved to the forefront of Veber's interest. Nevertheless, the basic Meinongian framework was still present as witnessed by a large but not very widely read work by Veber's pupil Ludovik Bartelj. The discussion of sensations is also to be found at the beginning of Meinong's theory of objects.

3. Veber's statement about the beginning of the theory of objects

Franc Veber dedicated his book *System of Philosophy* [Veber 1921] to his teacher Alexius Meinong. Before beginning to elaborate the system, he wrote a long chapter on the development of Meinong's philosophy. He also mentioned the booklet *On the Meaning of Weber's Law* [Meinong 1896] in which, according to him, the theory of objects was first developed. This must have been the general opinion of Meinong's pupils.

In this paper we have set ourselves the task of tracing the development of the theory of objects as it emerges from the theory of measurement. The theory of objects thus does not surface as the product of speculation, but as a byproduct of attempts to clarify conceptual issues in the empirically grounded theories of measurement – particularly measurement of the psychophysical – as known in the last decades of the nineteenth century. Here we examine the beginnings of the objective measurement of the psychological.

4. Veber's system of experiences

We first present Veber's system of experiences, a variant on Meinong's system. This will help us to trace the idea of Meinong's theory of objects in his early work where it was not explicitly and systematically available.

4.1. The dependency of experiences

According to Veber experiences begin with presentations, and they continue towards judgements, desires and volitions.

$$\text{presentations} \Leftarrow \text{judgements} \Leftarrow \text{desires} \Leftarrow \text{volitions}$$

The arrows denote dependencies among experiences. Whereas presentations are in principle capable of independent existence, judgements necessarily require presentations in order to exist. Similarly, desires include judgements, and volitions involve some previous experience for their existence.

4.2. Objects as parallel to experiences

As neither Veber nor Meinong were psychologists, they only took experiences as a starting point to be superseded by nonpsychological objects parallel but in no way identical to experiences:

$$\text{objects} \Leftarrow \text{objectives} \Leftarrow \text{dignitatives} \Leftarrow \text{desideratives}$$

It may be presumed that these objects are themselves unilaterally dependent on their inferiora (as judgements are dependent on presentations). Objects do exist in a parallel way to experiences, and hence they may be dependent upon each other in the same way as experiences are.

5. Meinongian objects

5.1. Objects

First, there are ordinary middle-sized objects: chairs, cats. These have a complete set of properties. Hence a chair has all the properties that one may wish to verify, simply because the chair actually exists: it is an actual object. But the fact that an object possesses all the properties does not by itself mean that all properties are accessible to knowledge or even that they are accessible. Objects (as non-psychological) are paralleled by presentations as their psychological counterparts.

5.2. Objectives[2]

There are other kinds of objects which may not be complete in the sense that they do not possess all the properties like the middle-sized chair. My perception of the chair and any perception in general selects some properties only. One may claim, although somewhat peculiarly, that these selected properties of my perception of the chair constitute a new object. In contrast to the first kind of object, which possesses all properties without necessarily displaying them, this new object possesses only a selection of properties. If the actual chair can be called a complete object, in contrast to it any selection of properties may be called an incomplete object.

It is logically possible to select any arbitrary collection of properties and call it an object. Even contradictory properties, such as "being made of stone",

[2] In this paper the word "objective" corresponds to the Meinongian German expression "*das Objectiv*", which stands for something objectual.

"being a bachelor" and "being married", would constitute an object in this sense [Sajama, Kamppinen and Vihjanen 1994].

Objectives, unlike objects, are incomplete objects of this kind. They do not possess all properties like ordinary objects do. Instead, objectives consist of a bundle of selected properties. They do not possess the kind of existence characteristic of ordinary objects, but they nevertheless have some sort of existence. This is why they may also be called objects.

Objectives are objects parallel to judgements. The psychological material which we encounter are thoughts and judgements, while objectives are their objectual counterparts.

Judgements as psychological entities are more complex than presentations. Yet corresponding to judgements as more complex psychological entities there are less complex kind of objects, namely objectives. Objectives are less complex than ordinary objects in the sense that they possess only a selection of properties.

5.3. Desideratives and dignitatives

Desideratives and dignitatives are further kinds of incomplete objects which correspond to emotional and volitional psychological experiences. In contrast to experiences, all these objects are nonpsychological.

In this paper we shall seek to show that when Meinong spoke of measurement, he was conceiving objects as a nonpsychological parallel to psychological experiences and not as psychological experiences themselves. This will be the first point in our contention that the first traces of the theory of objects are to be found in Meinong's booklet. Later we shall pay particularly close attention to objectives as the non-psychological parallel to psychological judgements – this being our second point. Neither middle-sized objects nor desideratives and dignitatives will be of any interest to us. The ontological switch important for the theory of objects occurs with objectives.

6. Psychophysics

Psychophysics studies the relationship between the physical and the psychological. The science of psychology was made possible by the discovery that there exists a lawful and empirically verifiable interdependency between an increase in the physical stimulus and variation in the corresponding psychic apprehension of this increase. Regularities of this kind were formulated as Weber's law.

7. Weber's Law, a summary presentation

It will be useful at this point to summarize Weber's law. A more detailed technical discussion of Weber's law, as well as of Fechner's and of Meinong's interpretations thereof, is given at the end of the paper.

Weber's law states that if there exists a relation between stimuli, there exists an appropriate relation among sensations:

$$_{st1}R_{st2} = {}_{st3}R_{st4} \Rightarrow {}_{s1}R'_{s2} = {}_{s3}R'_{s4}$$

Here, st_1, st_2, st_3, st_4 represent stimuli, and s_1, s_2, s_3, s_4 represent sensations. R and R' represent two different relations.

Meinong's main objective in his analysis of Weber's law is its relation-theoretic explanation, as he calls it. In this explanation he seeks the most adequate types of relations which could fit in the above formula as R and R'.

8. Towards diversity

We shall now try to explain how Meinong comes to the conclusion that the relation of diversity (*Verschiedenheit*) is essential. The relation of diversity will be considered as the main contribution of the theory of objects to measurement in general and especially to the measurement of the psychophysical. It will be shown that diversity is itself an objective – an object of a higher order. All measurements can be represented by the measurement of a surrogate, an object of a higher order, of the diversity. Measurement is the measurement of diversity. This will solve the problem of objective measurement of the psychological as well.

An always pertinent question regards the real aim of psychophysical measurement. Meinong's answer is that the measured feature is neither an intensity, nor is it something psychological. It is the diversity (*Verschiedenheit*) between the stimuli on the one hand and sensations on the other. The diversity is an *incomplete object*, characterized by the fact that it is a selection of *properties*. In order to see what the psychophysical is, one has to look at the measurement of the psychic. But measurement of the psychological does not address the psychological at all, nor intensity or whatever; and neither does it concern ordinary or complete objects. It concerns a bundle of selected properties, and therefore a particular kind of object. Measurement aims at an objective, at a special kind of relation between stimuli and a special kind of relation between sensations; in short, diversity. The introduction of diversity into measurement raises a second, even more important point, regarding the strong presence of the theory of objects in [Meinong 1896]. Therefore the aim of measurement is not something subjective or psychological.

9. Two levels

In Meinong's overall system one can distinguish two functionally different levels. The first of these is the grounding level, whereas the second level depends on the first, i.e. it is grounded. An example is the unilateral dependence expounded by Franc Veber. According to this theory, one level is dependent upon the other, whereas in the opposite direction this is not the case. In the system of experiences, thoughts are dependent for their existence on presentations, whereas presentations are able to exist without thoughts. But thoughts may again exist independently of desires, whereas desires are not able to exist without thoughts. Hence we have a system of functional dependency, where, in general terms, the higher level depends on the lower one.

The following table presents some of the features discussed and arranges them in the appropriate lower and higher levels. It should be noted, however, that the arrangement is relative, since for example thoughts as experiences may appear not only at the higher level, as they do in our case, but also at the lower level, where they figure as foundations for desires.

Feature	Experiences (Psychological)	Objects (Non-psychological)	Measurement
Lower level	Presentations	Objects (Middle-sized)	Objects (Middle-sized, Objectives, Desideratives, Dignitatives)
Higher level	Thoughts Desires Volitions	Objectives Dignitatives Desideratives	Diversity

It will be seen that psychological experiences are paralleled a similar kind of scheme for non-psychological objects. Objectives, dignitatives and desideratives unilaterally depend on middle-sized objects. Note, moreover, that in speaking about measurement we are dealing with another kind of unilateral dependency. The notion of diversity is unilaterally dependent on objects.

10. Measurement

The main point of our interest remains diversity, a concept that we shall now try to clarify. In order to do so, the classical definition of measurement will be briefly reconstructed.

When speaking of measurement one is interested in a special kind of projection of the world (of a non-sorted set) onto a sorted, well-ordered set. This set can be called a magnitude. There exist some restrictions on the ordering relation in this set which can be summed up as follows:

- the ordering relation consists of three relationships R_0, R_1 and R_2;
- since a, b, c are being elements of this set, the following axioms for these relationships should hold:

1) R_0, R_1 and R_2 must be a set of mutually exclusive binary relationships. That is, if a and b are any two elements connected by any one of these relationships, then: $\neg(aR_ib \wedge aR_jb)$, $i \neq j$;
2) R_0, R_1 and R_2 must be a set of alternative relationships. That is, if a and b are two elements, then they can be logically connected by any one of these relationships: $aR_0b \vee aR_1b \vee aR_2b$;
3) R_0 must be symmetrical and transitive;
4) R_1 and R_2 must each be asymmetrical and transitive;
5) R_1 and R_2 must be converse.

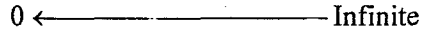
11. Magnitude according to Meinong

We shall now try to compare Meinong's definition of magnitude against the standard definition mentioned in the previous paragraph. This will enable us to see how his definition of measurement is formulated. Further, we shall discuss intuitive and nonintuitive magnitudes, as well as divisible and nondivisible ones.

11.1. Magnitude as limiting towards zero

Meinong determines magnitudes through limiting towards zero.

What may be measured possesses a magnitude. Magnitude is anything that is contrary to zero. So magnitude is limited by zero on one side, whereas its other side may extend to infinity. Greater and greater magnitudes are possible.



Magnitude may therefore be represented with a line originating in infinity. Magnitudes can be intuited, but this cannot be so easily said of the zero to which each magnitude is directed.

To say that magnitude limits towards zero means that between any magnitude and zero an infinity of points may be inserted. It is easy to conceive any magnitude as dividing into two halves. Each half may then be halved again.

Between any point which possesses magnitude and zero there may always be another point: [3]

0 ←———A'''——A''——A'——A——

In this sense, magnitudes are dense. Since magnitudes are dense in the sense described, it is difficult to say to what they exactly correspond if taken ontologically (Magnitudes should not be confused with distances.).

In order to clarify this issue Meinong introduces the notion of diversity. Besides clarification, he had another reason for doing so. His definition of magnitude is bound up with the mathematical concept of limit. According to Meinong this may trap us in circularity. Defining magnitude by means of mathematics is *per definitionem* to deal with magnitudes that do not hold.

Hence the gap which occurs when omitting the mathematical concept of limit is filled by the relation of diversity. Using this relation, a non-mathematical reading of limitation is obtained: between an arbitrary A and 0 an A' can be inserted where this A' is less diverse from A and 0 than A is diverse from 0.

11.2. Intuitive and nonintuitive magnitudes

Since intuitive magnitudes such as distance and weight can be intuited, we may grasp them directly. It is easy to hold a distance of one meter before one's eyes and also to feel the weight of one kilogram by holding it in one's hand.

Nonintuitive magnitudes such as kinetic energy or speed may not be directly intuited. Speed is length divided by time. Sice speed cannot be intuited, it is not a simple object, and perhaps it is not an object at all. Speed is an example of an *objective*. It is in fact a complex object, a complexive. Complexives are combinations of intuitive objects. The principle of building a higher level on the lower level is preserved in their case. Nonintuitive magnitudes taken as complexives are made up of intuitive magnitudes, which are combied into a kind of object as the togetherness of properties. Distance and time are intuitive, whereas speed is not. Speed is a fraction of the first two.

Intuitive magnitudes may be directly grasped, but they can also be presented with the help of numerals. Thus, in the case of non-intuitive magnitudes it is essential for them to be presented as numbers because they cannot be directly grasped. It is not difficult to see that the numerical presentation of magnitudes is not their essence.

[3] The notion of limitation can be most easily conweyed by using mathematical formalism. A sequence "a_n" is said to be limiting towards zero iff: For every arbitrarily small e there is a n so that a_n is smaller than e.

For Meinong, speed is therefore a complexive, it is an object of a higher order in which the lower-order intuitive magnitudes are joined as two simple objects. Note that by ascribing magnitude not only to intuitive magnitudes but also to complexives (higher-order objects), Meinong commits himself to the theory of objects.

11.3. Divisible and nondivisible magnitudes

Divisible and nondivisible magnitudes present a different kind of classification of magnitudes.

Distance is a divisible magnitude. The distance of one meter may be divided into centimeters. It may be thus presumed that distance consists of smaller distances. Relation, on the other hand, is a nondivisible magnitude. The relation of being taller, the fact that I am taller than you may not be divided into more basic facts; there are no parts of tallness incorporated into the relation of being taller.

There are two special indivisible magnitudes, according to Meinong, the relation of equality and the relation of diversity. We shall see later that diversity (which was defined as essential for measurement) is of greater importance to him.

In similar manner, intensive quantities such as feelings and emotions are nondivisive magnitudes. A love or a hatred does not consist of several parts of the same emotion which, when added, would give the result of the actual intensity of emotion. Hence, emotion cannot be divided into smaller parts of emotion.

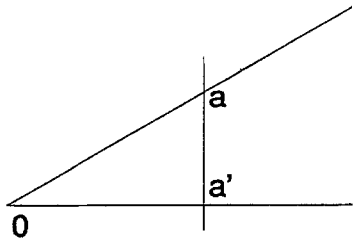
May nondivisible magnitudes be said to be built on divisible magnitudes? Does the fact that I am in the relation of being one meter away from you, which is a nondivisible magnitude, base itself upon the divisible magnitude of one meter? This may not seem to be the case for the moment, but we shall see later that nondivisible magnitudes do depend on divisible ones in some sense. Nondivisible magnitudes can be measured only through a surrogate, which must be a divisible magnitude.

12. Comparing as correlating with good enough result

Magnitude was determined as limiting towards zero. We have discussed the limitation in one dimension only. This was appropriate, since the comparison that underlies measurement seems to be sensible in one dimension only. Hence one may sensibly compare shades of green, or again the extensions of various surfaces. But it does not make sense to compare this shade of green with that extension of surface. It may be also said that, for comparison to take place correlations should take place in a single dimension. There is a dimension of shades of green that may be compared and there is a separate dimension of

extensions of surfaces. Each single dimension may be represented by a line limiting towards zero.

The idea that comparison will yield good results in a single dimension only is supported by the following reasoning, which again makes use of zero as a limit of magnitude. Everything can be compared: for example my left shoe and a particular storm although every comparison is not necessarily relevant to measurement. There is nevertheless an infinite number of features that can be compared, but there is a limit on the way in which they are compared: they can be compared only within one dimension. The reason for this is as follows. If all dimensions are assumed to be the dimensions of magnitude, and thus of interest for us, they all limit towards zero. Zero is their common point of limitation, because all magnitudes coincide in it, and thus they find their common contradictory point. Zero is a point towards which all dimensions of magnitude are directed.



Let us look at just two such dimensions, represented by two lines directed towards zero. If there are two points on each particular line, it will be useful to compare them because they are both placed on the same line directed towards zero. But if two points are compared from two different dimensions, as in the case of points *a* and *a'* in the above diagram, and if a line is drawn between these two points, this line will not limit towards zero. In fact, it will aim in a quite different direction, as will be seen in the figure. But if comparison takes place on the line which does not limit towards zero, this comparison is of no interest at all. It will not be a comparison of any interesting magnitudes, more precisely it will not involve any magnitude at all. Hence comparing is interesting for measurement only if it is a correlation within one dimension which can represent a magnitude. This form of comparing is called "comparing with a good enough result" by Meinong.

Comparing on an one-dimensional line results in a new object which is of a higher order than the objects compared. This comparison takes several points positioned on a single line and interpretable as properties of the objects compared. The taking and merging some selected properties thus represents a typical Meinongian object. On the other hand, the relating of such bundles of properties represents a more incomplete object. We could say that when

comparing, a new object of a higher order arises. This object is definitely an objective, the relation of diversity.

13. Equality and diversity

So far we have shown how the relation of diversity defines the well-ordered set, the magnitude. We have shown that diversity is one of the two relations that can themselves be thought of as magnitudes. Diversity is a kind of surrogate magnitude with which to measure all other magnitudes. All other objects, middle-sized objects, objectives in general, dignitatives and desideratives are measured via the special objective (higher-order object) called diversity.

The problem that arises at this stage of our inquiry concerns the second relation mentioned in the title of this paragraph and which could equally well take the role of the central relation in defining magnitude. This is the relation of equality. We shall see that we have to decide in favour of diversity. The stating of diversity is more important than the stating of non-diversity or of equality. Diversity is a basic epistemological datum.

We are dealing with the non-psychological here, with Meinongian objects and not with psychological experiences, although we are aware that the psychological exists and moreover that it provides the grounding for the non-psychological.

One may assume that the main psychological problems of perception can be represented in the existence of the psychological threshold. We have to take into account our comprehension of things. We discern things as being diverse only above a certain psychological threshold.

Diversity exists as such but we see discernibility. Below our psychological threshold, things are diverse but we are not necessarily able to discern them. Once we discern them, diversity and discernibility coincide again, but there is a continuum below the limit of discernibility.

Meinong, however, adheres to diversity. Diversity is important for him, whereas he holds discernibility to be an artificial construct.

Assuming the latter, it is clear why the relation of equality is inadequate. Things seemingly equal are not necessarily equal if they are below the threshold, and therefore they are not non-diverse but only indiscernible. This however does not mean that things cannot be regarded as equal. Hence equality exists. It is just not as epistemologically important as diversity.

In trying to overcome the psychological problems, Meinong decides in favour of the relation of diversity and against the relation of equality. His decision is a consequence of the theory of objects, since this theory deals with the non-psychological. Metaphorically speaking, the psychological problems of perception are subsumed in a preference for the relation of diversity. This problem would not occur if the psychological threshold vanished. In this

regard, the main idea is to allow physics to take care of the psychological threshold, which could happen if more advanced and precise measuring devices were developed. Meinong is against this possibility, his opinion being that the use of physics only pushes the psychological threshold downwards, without an end in sight.

14. Diversity as the ordering relation – measurement according to Meinong

If the Meinongian notion of diversity is taken as the central ordering relation in a well-ordered set, the five axioms in section 10 which define this set ought to be slightly changed. The first axiom remains, as well as the second, the fourth and the fifth (Note that we still admit the relation of equality.). The only axiom to be changed is the third. We may say that R_0 is symmetrical but we can not maintain that it is transitive.

If there are three elements a, b and c, where a and b being equal and b and c are equal, too, there is no reason why a and c should be equal. Comparison of a and b can thus take place below the psychological threshold, the comparison of b and c as well, while comparison of a and c can occur above the threshold. We can thus discern the difference between a and c, but not the differences between a and b, on the one hand, and b and c on the other.

Having discussed the difference in the formal structure whereby measurement is defined as brought about by the introduction of diversity, we can now clearly see all the consequences.

The five modified axioms still admit of measurement, but this measurement is somehow limited. It is limited because of the epistemological preference for diversity and because of the epistemological neglect of equality. The fact that the relation of equality is not transitive limits measurement to comparison between two elements. This limitation is of course present only when equal elements are measured. If this is not the case, if they are different, there is no limitation on measurement.

In the following sections we shall discuss some of the kinds of measurement classified by Meinong. We shall see that measurement as modified in the above sense allows for measurement of the psychophysical.

15. Direct and indirect measurement

Direct measurement is represented by the simple measurement of length using a meter. Indirect measurement, on the other hand, is represented by the use of weights and a balance to measure gravitational force. Direct measurement is possible without intermediaries whereas indirect measurement makes use of intermediaries.

Direct measurement applies to the divisible magnitudes only, whereas indirect measurement applies to divisible and nondivisible magnitudes.

16. Proper and surrogative measurement

Proper measurement allows the measurement of distance. Surrogative measurement is illustrated by the measurement of temperature using the height to which the liquid in the capillar of the thermometer rises: this is mediate measurement.

The difference between indirect and surrogative measurement is that the former uses non-proper means only, while the latter uses a non-proper measuring basis. Direct measurement is always proper, whereas indirect measurement can be surrogative as well.

17. Measurement of the psychological is a surrogative measurement

Yet the introduction of surrogative measurement enables measurement of all magnitudes defined as limiting towards zero, including indivisible magnitudes.

According to Meinong, psychological measurement can be represented as the measurement of Meinongian magnitude. Psychological data can be compared according to the relation of diversity. Thus the psychological can be measured by the use of the non-psychological, by diversity. But diversity is itself a relation, a nondivisible magnitude, hence it cannot be measured directly either. All nondivisible magnitudes could only be measured indirectly, via a divisible magnitude, which is usually something physical. Thus the conclusion is that the objective measurement of the psychological is possible.

18. Appendix: Psychological measurement and Weber's law

By enabling measurement of the psychological, diversity (*Verschiedenheit*) entails that there does not exist a difference but a ratio among psychological magnitudes (sensations). This gives rise to a distinct mathematical formulation of Weber's law.

Difference (*Differenz*, *Unterschied*) as a special kind of diversity applies to divisible magnitudes, where it is possible to measure distances between objects.

Diversity (*Verschiedenheit*) as such applies to nondivisible magnitudes as well, to which distance may only be ascribed surrogatively. Diversity is perhaps nearer to the psychic.

18.1. Weber's law

Weber's law states that there exists a functional relation between stimuli and sensations. Take stimuli st: st_1, st_2, st_3, st_4. Take sensations s: s_1, s_2, s_3, s_4. Weber's law states that if there is a certain relation between stimuli, there exists an appropriate relation between sensations:

$$_{st1}R_{st2} = {}_{st3}R_{st4} \Rightarrow {}_{s1}R'_{s2} = {}_{s3}R'_{s4}$$

This is Weber's law without Fechner's interpretation.

18.2. Fechner's interpretation of Weber's law

Fechner takes a ratio to represent the relation between stimuli: $_{st1}R_{st2}$ becomes st_1 / st_2 and $_{st3}R_{st4}$ becomes st_3 / st_4.

Stimuli may be divisible or nondivisible magnitudes. Hence it does not actually matter what relation (difference or diversity) is taken to hold between stimuli if we merely wish to admit of at least some kind of stimuli. If we wish to include all maximally possible stimuli on the other hand, these being divisible and non-divisible magnitudes, we should opt for diversity. According to Meinong, diversity is represented properly enough by the use of ratio. Meinong thus allows Fechner's interpretation of the relation R.

Regarding the relation between sensations, Fechner does not take ratio but difference: $_{s1}R'_{s2} = s_2 - s_1$ and $_{s3}R'_{s4} = s_3 - s_4$.

This stipulation is something to which Meinong would not subscribe. Indeed, he was very sceptical about it, because he believed sensations to be non-divisible. In other words, it is not possible to formulate a mathematical difference between two of them. Relating two sensations in such a way that a mathematical difference is formed is thus not correct. From these two premises (taking ratio for the relation between stimuli, and taking difference for the relation between sensations) Fechner derived the famous Weber-Fechner law: s = C log st (sensation equals a constant multiplied by the logarithm of a stimulus).

18.3. Derivation of Fechner's law

R and E are constants. It is taken for granted that the following holds:

$$\begin{aligned} st_1 / st_2 &= R & s_2 - s_1 &= E \\ st_2 / st_3 &= R & s_3 - s_2 &= E \\ &\vdots & &\vdots \\ st_n / st_{n-1} &= R & s_n - s_{n-1} &= E \end{aligned}$$

and thus generally

$$st_n / st_1 = R^{(n-1)} \qquad s_n - s_1 = (n-1)\cdot E$$

We now express (n – 1) from both sides

$$\log (st_n - st_1) / \log R = (n - 1) \quad s_n - s_1 / E = (n - 1)$$

Equalizing the two expressions, one obtains Fechner's formulation of Weber's law.

$$s_n - s_1 = C \log st_n - \log st_1$$

It is assumed that sensation s_1 equals zero, and $\log st_1$ as well. s_1 is thus taken to be the margin of the threshold; st_1, on the other hand, is taken to be the unit on the scale of stimuli and thus equals 1, $\log st_1$ giving 0. Consequently, we omit indexes "n" from the last formula in order to obtain the general expression

$$s = C \log st.$$

18.4. Meinong's criticism of Fechner's formulation of Weber's law and Meinong's formulation of Weber's law

As already mentioned, Meinong claims that all sensations are nondivisible magnitudes. The relation of diversity itself is such a magnitude. Therefore, diversity in general cannot be formulated as a difference but only as a ratio. The right hand side of the derivation in the above sequence concerning sensations is therefore wrong. Instead of difference one should take diversity. Ratio is the closest mathematical way to do this in this case as well.

Hence on the right hand side of the derivation one obtains the same type of mathematical formula as on the left hand side:

$$st_n / st_1 = R^{(n-1)} \qquad s_n / s_1 = E^{(n-1)}$$

Hence derives the fact that sensation depends on stimuli not logarithmically but exponentially. We again express (n – 1) from both formulas and set them equal. From

$$(\log st_n - \log st_1) / \log R = (n - 1) \qquad (\log s_n - \log s_1) / \log E = (n - 1)$$

follows

$$(\log st_n - \log st_1) / \log R = (\log s_n - \log s_1) / \log E$$
$$(\log st_n - \log st_1) = (\log s_n - \log s_1) \log R / \log E.$$

Again st_1 is taken as a unit ST and $\log st_1$ is set at 0 marking the threshold. Instead of $\log E / \log R$ a constant K is introduced. We obtain:

$$K \log (st_n/ST) = \log s_n$$

In the next step index n and logarithm is omitted:

$$st^K (1/ST^K) = s$$

And finally substituting the constant C for $1/ST^K$ yields:

$$s = C \cdot st^K$$

18.5. Additional remark

Meinong's main point is the introduction of diversity, as a special nondivisible magnitude (relation). By enabling measurement of the psychological, diversity entails that there does not exist a difference between psychological magnitudes (sensations) but a ratio. This gives rise to a different mathematical formulation of Weber's law.

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