

Prototype theory



**ASSIGN
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PROTOTYPE THEORY and DEFINITIONS:**THE ROLE OF BASIC FACTORS, LEARNT KNOWLEDGE and CULTURE**

- a small-scale empirical study -

1.**Introduction**

The purpose of the present empirical research paper is to investigate how Prototype Theory works in defining categories in real life. The theory was introduced by Rosch (1975) in order to explain how semantic categories are represented in our mind. Several experiments prove the functioning of Prototype Theory, but in everyday life we often categorise instances based on our culturally bound definitions rather than based on similarity to a typical instance. Thus, this paper investigates the role of the two mechanisms through a small-scale study, aiming at finding answers to the following research questions:

1. Are prototypes and definitions formed similarly or differently?
2. What is the role of learnt knowledge in creating the prototypes and definitions?
3. Do cultural factors play a role in creating prototypes and definitions?

2. Literature review**2. 1. Basic concepts**

In this section a review of the most important concepts related to Prototype Theory will be provided.

To begin with, *prototype theory* “ suggests that many mental concepts we have are really prototypes. [...] (It) has been useful in investigations into how concepts are formed, [...] and to what extent certain concepts can be considered universal or specific to certain cultures / languages” (Longman Dictionary of Language Teaching and Applied Linguistics, 2003, p. 432).

A *prototype* is “ a person or object which is considered (by many people) to be typical of its class or group” (Longman Dictionary of Language Teaching and Applied Linguistics, 2003, p. 432). Rosch (1975) defines it as “ the clearest case of a category”, and Aitchinson (1984) also stresses the typicality of the prototype regarding its category. The prototype consists of a set of *prototypical features* , which are the attributes that are shared by most members, but by only a few non-members (Rosch, 1975), therefore are able to differentiate between categories.

A *category* is a set of attributes that we consider as characteristics of groups of people or objects, or “ a number of objects that are considered equivalent” (Rosch, 1978). The category plays an important role in word recognition because it can serve as the basis of identification of an object, as “ people often define a concept by reference to typical instances” (Longman Dictionary of Language Teaching and Applied Linguistics, 2003, p. 432).

Other related concepts to prototypes are stereotype and schema.

Stereotypes are “ beliefs about groups”, i. e. the number of attributes that we consider as characteristics of certain social groups (The Cambridge Dictionary of Psychology, p. 520). There are, for instance, stereotypes based on race, ethnicity, gender or certain professions. A *schema* is a concept used

in pragmatics to refer to a “ mental representation of a typical instance. Semantic processing allows people to interpret new experiences quickly and economically.” (Cook, 1997, p. 86).

All in all, prototypes play an important role in the cognitive processes of categorisation and word identification, which will be discussed in the following section.

2. 2. Prototypes in categorisation

The mental representation of a prototype is formed on the basis of several factors. First, a prototype is often described on the basis of its *appearance* : the size, the colour or the shape of an object can influence whether they are considered as typical instances of a category. Second, in some cases it is important what the object is capable of doing. For example, one of the most important characteristics of a bird is that it can fly, and a flightless bird is often considered as less typical. Moreover, *the usage* of an object often influences our judgement about the typicality of the object. Finally, the *frequency* of the word also defines whether we consider it typical or not, as a bird that always sings outside our windows can be judged most typical than an exotic bird that we rarely encounter. All in all, these characteristics influence our judgements of the typicality of objects with regards to certain categories (Rosch, 1978).

According to another aspect, two types of attributes can define a category. Aitchinson (1987) distinguishes between *identification criteria* and *stored knowledge* , i. e. the attributes that are essential to the identification of a concept, and the attributes that we attach to the objects through our learnt

knowledge of the world. In this respect the impact of one's culture is of high importance, as there is evidence that prototypes vary from language to language, and from culture to culture (Schwanenflugel and Rey, cited by Field, 2003, p. 103). For instance, on the basis of its appearance, a bat could be categorised as a bird, but influenced by our knowledge we acquired in our biology lessons, we will most probably put the bat in the category of mammal.

The role of the above mentioned basic factors, learnt knowledge and cultural stereotypes and schemata was investigated in an empirical study, which will be outlined in the next section.

3. Research methods

The aim of the empirical study is to answer the research questions presented in the Introduction. Research is based on data collected with the help of a questionnaire, and analysed quantitatively.

3. 1. The research instrument

The research instrument consisted of two basic parts.

In the first part of the questionnaire there are five lists of words that participants had to evaluate on the basis of their typicality with regards to certain categories. The five lists of words were chosen on the basis of Rosch (1975, cited by Field, 2003, p. 102.), and consisted of nine words that had to be evaluated on a 7-item scale, on which 1 means the least typical, and 7 is the most typical instance.

In the second part of the questionnaire participants had to define the same categories with their own words. The aim of the five open-ended items was to identify the basic attributes participants used to formulate a definition of the categories. These answers were then compared with the results of the judgements of prototypicality in the previous task, with the purpose of giving an account for the similarities and differences in the two kinds of mental operations.

3. 2. Participants

The research was carried out with the participation of 25 respondents. They were approached through personal contacts on the Internet. The average age of the participants is 22. 4 years, and the gender proportion is almost equal (with 13 male and 12 female respondents).

4. Results and discussion

The aim of this section is to present and analyse the data of the empirical study, with the purpose of finding answers to the research questions.

4. 1. The judgements of typicality

The results of the judgements of the typicality of the instances of the categories are in line with Rosch's (1975) findings that prove that the typicality of certain instances is evaluated very similarly by different people.

Table 1 shows the order of the words within the categories:

Table 1. *The order of instances within the categories based on the respondents' evaluation on a 1-7 scale.*

| | | | | |
|-----------|------|---------|-------|-------|
| Furniture | Bird | Vehicle | Fruit | Woman |
|-----------|------|---------|-------|-------|

| | | | | | | | | | |
|-----------|----------|-----------|----------|-------------|----------|---------|----------|-----------------|----------|
| table | 6. 85 | blackbird | 6. 92 | car | 7 | apple | 7 | mother | 7 |
| dresser | 6. 77 | hawk | 6. 92 | bus | 7 | orange | 7 | nurse | 6. 76 |
| chair | 6. 76 | sparrow | 6. 87 | subway | 6. 69 | pear | 6. 93 | teacher | 6. 67 |
| stool | 5. 61 | raven | 6. 77 | taxi | 6. 08 | melon | 6. 54 | actress | 6. 54 |
| lamp | 4. 08 | parrot | 6. 62 | cart | 5. 77 | mango | 6. 54 | ballerina | 6. 23 |
| piano | 3. 62 | canary | 6. 54 | yacht | 4. 08 | fig | 6. 23 | doctor | 5. 92 |
| vase | 2. 39 | ostrich | 5. 30 | elevator | 2 | nut | 3. 23 | police-woman | 4. 77 |
| picture | 2. 30 | penguin | 4. 85 | ski | 1. 85 | pumpkin | 2. 84 | miner | 3. 30 |
| telephone | 1. 92 | bat | 1. 38 | wheelbarrow | 1. 69 | olive | 2. 30 | football player | 2. 46 |

The evaluation of the prototypicality of the items seems to be based on several factors. The first factor is the appearance of the items, which

influenced the judgements of prototypicality in the case of, for instance, the categories of bird or fruit, where the most typical instances have a lot in common with regards to physical appearance.

Another aspect is the frequency of the items, that is, how often respondents encounter the given instance of the category in real life. The category of fruit is a good example for the importance of this factor, in which apple and orange were the ones being judged as most typical instances, and the less frequently consumed exotic fruits like mango or fig scored lower. Another example is the category of bird, in which the different evaluations of blackbird and canary cannot be accounted for in terms of physical appearance (they are quite similar in size and form). The frequency of the two species, on the other hand, is different, as the blackbird is a more common type of bird than the canary.

A final factor in the judgement of the typicality of the objects is cultural schemata and stereotypes. The best example of the importance of cultural factors can be seen in the category of woman, where the traditionally feminine roles (e. g. mother, nurse or teacher) scored higher than the traditionally masculine professions (e. g. policewoman, miner or football player). Our culturally bound schemas are in work in the case of vehicles as well, where car and bus embody the best instance, while cart scored considerably lower.

The fact that prototypicality is a universal phenomenon of our minds is suggested not only by the consistency of the answers, but also by the fact that the findings are very similar to the results of the original experiment by

Rosch, as summarised by Aitchison (1987, p. 53): “ On the bird list, sparrow, canary, blackbird, dove and lark all came out high. Parrot, pheasant, albatross, toucan, and owl were somewhat lower. Flamingo, duck and peacock were lower still. Ostrich, emu and penguin came out more than half-way down the seven-point rating, while last of all came bat, which probably shouldn’t be regarded as a bird at all.” Although the present research did not investigate the prototypicality of all items on the original list, the order of the items of my own study are in line with the findings of Rosch.

4. 2. The definition of the categories

According to the results, the definitions of categories are based on the same factors as the prototypes. Categories differ concerning whether they are formed on the basis of appearance, usage or frequency, and whether identification criteria or stored knowledge are dominant in forming the category.

Table 2. *The scores of the elements according to the number of their appearance in the definitions of the categories.*

| | Appearan ce | Usage / function | Frequen cy | Experien ce | Learnt knowledge |
|---------------|----------------|---------------------|---------------|----------------|---------------------|
| Furnitur e | 8 | 24 | 0 | 21 | 9 |
| Bird | 19 | 20 | 0 | 20 | 21 |
| Vehicle | 6 | 16 | 1 | 15 | 18 |

| | | | | | |
|-------|----|----|---|----|----|
| Fruit | 17 | 18 | 0 | 19 | 19 |
| Woman | 5 | 7 | 0 | 10 | 21 |

The definitions of the categories were coded into numerical data: the definitions were broken down into components of meaning (based on the factors that determine prototypes, see section 2. 2), and then the different components were grouped according to whether they referred to appearance or property, usage or function, or the frequency of encountering the given category. It was also decided whether the participant used world experience or learnt knowledge to formulate a definition.

The results reveal that the dominance of the certain aspects of meaning in creating a definition varies from category to category. The definition of furniture is based on usage and function (e. g. “ an object with functions of decorating and personal use”) and world experience. In the case of the category of bird, appearance (e. g. “ has wings”) and function (i. e. what it does, for instance “ usually capable of flying”), and experience (e. g. “ it can sing”) and learnt knowledge (e. g. “ a type of vertebrates that reproduces with eggs”) play an equal role. Vehicle is defined dominantly according to its usage (e. g. “ used for the transportation of people”), but experience and knowledge are both important bases of the definition. The definitions of fruit use all four aspects equally. Finally, the category of woman is defined negatively in a lot of cases (e. g. “ the opposite of man”), and almost exclusively on the basis of learnt knowledge (e. g. “ has XX chromosomes and capable of giving birth”). It is important to note that the frequency of

encountering the category, which is an important factor in judging the typicality of an instance, does not play a role in defining a concept.

4. 3. Prototype theory in the light of the results

The results imply that the theoretical Prototype Theory and the “ everyday” definitions of categories work similarly in practice.

(1) Are prototypes and definitions formed similarly or differently?

According to the results, the same factors (as outlined by Rosch (1978, see section 2. 2.) play a role in formulating prototypes with regards to a category and in formulating a definition of the category. The mental operations that underlie the forming of stereotypes play a role in forming the definitions, although the definitions do not cover every prototypical instance.

(2) What is the role of learnt knowledge in creating the prototypes and definitions?

Based on the results of the study, stored knowledge determines prototypicality in the case of some categories. Attributes that we attach to the objects through our learnt knowledge of the world seem to override our world experience especially in the case of the definitions, which are most often formulated on the basis of learnt knowledge.

(3) Do cultural factors play a role in creating prototypes and definitions?

Cultural factors play a role in the judgement on prototypicality and creating definitions. Cultural stereotypes are at work in the case of the category of “ woman”. Judging the prototypicality of the given social roles, cultural

stereotypes and conventions determined the answers. The definition of the category of “ woman” was defined on the basis of both biological sex and the social convention of gender.

5. Conclusion

The present small-scale empirical study investigated the similarities and differences of the functioning of Prototype Theory and definitions. The results imply that the theoretical approach of Prototype Theory and the “ everyday” definitions of categories work similarly in the practice, as the same basic factors, learnt knowledge and cultural aspects underlie the mental representations of prototypes and categories.

6. References

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