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Research Article

Object and Face Naming Tasks In Relation To Same and Different Category Conditions

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Abstract

An experiment of two factors (2X2) within participants ANOVA design was conducted. 20 UEL students in total have taken part. The experiment -partial replication of the Damian et al. (2001) and Vitkovitch et al. (2006) experiments- had two stimuli/factor 1 (object and faces) and a context/factor 2 of four conditions (homogene-ous/heterogeneous for objects and homogeneous/heterogeneous for faces). It was predicted that participants will need longer time to respond to homogeneous objects than to heterogeneous, whereas shorter time for homogeneous faces and longer for heterogeneous ones. The experiment has shown no significant semantic effect for homogeneous and heterogeneous conditions in the context factor, whereas an overall slow significance in relation to the stimulus factor, i.e. faces were named more difficult than the objects. The interaction that was found between objects and faces has shown marginal significance towards the predicted direction on behalf of the faces over the objects. There was concluded that object naming refers to minor latencies compared to high ones of face naming.

Keywords: object naming; recognition; face naming; recognition; homogeneous; heterogeneous

Introduction

The aspect of object and face naming is related to the idea of finding out theoretical accounts about recognition and naming. Researchers are interested in understanding how neuropsychological evidence in connection with object and face naming provide links with brain damage lesions. The processes involved in object and face naming assist neuroscientists to identify and discuss such impairments. Object and face naming experiments play a crucial role towards that direction, for they are able to provide with relevant evidence the understanding of impairments related to recognition.

The consideration of semantic competition is of similar importance in face and object naming. In particular, retrieval of objects is concerned with semantic competition. That is to say that someone by retrieving the name of a 'horse' in relation to a picture of a 'horse', it means that any cognitive representation of another object, say 'zebra', will compete cognitively to the involved understanding of the former. The semantic competition is slowed down, if, for a printed word such as 'horse', a picture of 'zebra' is shown above. This is known as 'picture interference' and means that an unrelated word in contrast to a different picture is activated through a different picture and vice versa (Glaser & Düngelhoff, 1984).

Damian et al. (2001) attempted two experiments referring to lexical retrieval as a competitive process in relation to the semantic context on picture and word naming in German. The authors claimed that the facilitatory effect observed, has been caused because of interactive processes between spelling input and semantic codes. They have found that semantic context the way it interferes in recognizing words is connected with the entry words which are retrieved during speaking. On the other hand, Vitkovitch et al. (2006) have carried out three experiments which were related to semantic priming effects during face naming. They have examined whether there is semantic competition between face and object naming. The results they found provide some evidence concerned with facilitatory effects taking place in naming famous homogeneous faces without having them in parallel to semantic competition. Vitkovitch et al. (2006) consider that there is a need of modification of any face naming serial account so to be differentiated from the already established theoretical claim about object naming.

The aforementioned semantic context and picture-word interference paradigm can also be involved in a manipulation where the semantic context is manipulated and subjects attempt to name faces and objects from both same and different category. The experiment that will take place will question whether participants' time of naming homogeneous objects and faces is longer or shorter compared to heterogeneous ones. The rationale of this experiment refers to the aspect of retrieving objects and faces in relation to the semantic competition of picture-word interference occurring between related and unrelated fillers. In this way it is predicted that participants will need longer time to name homogeneous stimuli in comparison to heterogeneous ones. The hypothesis for this experiment, therefore, is that participants will need more time to name same category objects than objects from a different category, whereas also unrelated faces compared to related ones.

Method

Participants

Participants were volunteered from a UEL (University of East London) student population. They were 20 males in total. Their age range varied from 18-40. Participants were explained the aim of the experiment. They were told to feel free to withdraw at any time from the experiment if they wanted so. They were also told that the data

collected will be treated in confidentiality and for experimental purpose only; that they will remain anonymous, whilst participants were also debriefed after the experiment was completed.

Design and Stimuli

There was conducted an experiment with two factors. The factors are stimulus and context. Each factor has got two levels. The stimulus factor has got the levels of objects and faces and the context factor the homogeneous/heterogeneous category for objects and the homogeneous/ heterogeneous category for faces.

The type of the experiment will be a within-participants ANOVA 2X2 design. There are two independent variables (objects and faces). The dependent variable is the time to name both stimuli.

The four individual conditions were:

1. Homogeneous objects consisted of four-legged animals such as: dog, sheep, etc;
2. Heterogeneous objects consisted of unrelated items such as: shirt, orange, spoon etc;
3. Homogeneous face stimulus was consisted of actors such as: Tom Cruise, Johnnie Depp, etc;
4. Heterogeneous faces consisted of unrelated faces of singers, politicians, football players, scientists such as: Albert Einstein, David Beckham, Michael Jackson, etc.

In all four conditions the stimuli were repeated five times and in random order. The random order followed the numbers according to the practice sheet. There was also attempted to be controlled confounding variables such as picture distances between the items across all four conditions as well as the faces chosen in both homogeneous and heterogeneous conditions which were all males, so semantic context and sex not to be confounded. In all four conditions pictures were presented in black and white, they were of the same size and height and they covered four A4 pages.

Procedure

In a group of four students, twenty participants were collected -five participants for each experiment. Homogeneous and heterogeneous objects as well as homogeneous and heterogeneous faces were compiled in four A4 pages, where the pictures of objects and faces were differently placed on each of the five rows of the page.

For participants to familiarize themselves with the experiment, they were asked to take part in two practice sessions. The practice would refer to the general procedure of the experiment, so participants to be able to understand what would be required from them. The first session was concerned with naming numbers repeated in a random order of five rows and the second with recognizing all homogeneous and heterogeneous pictures of objects and faces, which were cut and presented to them individually. Participants were also practiced in face naming. They were told to use both names and surnames and were amended if they did not cite them correctly.

After the practice sessions, participants were instructed to look at the first A4 page and name all homogeneous and heterogeneous objects and faces. Stimuli and context in all four conditions were presented in five rows and in random order, just like the numbers in the practice sheet. Attention was kept by the experimenter participants not to repeat the same stimuli twice in succession. Participants were asked to name all stimuli of the sheets by working across the rows of each condition from the left to the right. If they were to find difficult to name any object or face they were told to proceed with the next until the four object and face naming pages to be completed. For the purpose of the experiment the time participants needed to reply to stimuli was measured. For this reason a stopwatch with centisecond timing was introduced, in order the experimenter to time how long participants would need to name from the first stimulus to the last of every sheet. Finally, all four conditions across the participant group followed the order:

1. Homogeneous objects
3. Homogeneous faces
2. Heterogeneous objects
4. Heterogeneous faces

Results

There was conducted a two factors within participants ANOVA design and the analysis obtained from the data collected from the experiment exhibits the following results:

The mean response times (RT), SD, errors, mean error rates and average mean error rate for homogeneous and heterogeneous objects are 28.8sec/26.4sec, 7.8/8.8, 6/3, 0.3/0.15 and 0.22 respectively. That means that participants needed longer time to name the homogeneous objects condition than the heterogeneous one.

Stimulus	Context	Mean RT	SD	Errors	Mean error rates	Average mean error rate
Objects	Homogeneous	28.8sec	7.8	6	6÷20=0.3	0.3+0.15÷2=0.22
	Heterogeneous	26.4sec	8.8	3	3÷20=0.15	

Table 1: Stimulus/Objects Statistics

On the other hand, the mean response times (RT), SD, errors, mean error rates and average mean error rate for homogeneous and heterogeneous faces are 45.3sec/55sec, 17.16/20.07, 7/9, 0.35/0.45 and 0.4 respectively. In the face naming conditions the analysis showed the other way around. Participants needed longer time to name the heterogeneous faces than the homogeneous ones.

Stimulus	Context	Mean RT	SD	Errors	Mean error rates	Average mean error rate
error rate Faces	Homogeneous	44sec	17.16	7	7÷20=0.3	0.35+0.45÷2=0.4
	Heterogeneous	55sec	20.07	9	9÷20=0.15	

Table 2: Stimulus/Faces Statistics

Finally, there is no significant interaction between stimuli and context. However, the faces factor has a greater impact than the objects one, implying that participants for the face homogeneous/heterogeneous conditions needed more time to respond compared to the object homogeneous/heterogeneous conditions. Both the former and the latter are shown in the graph below:

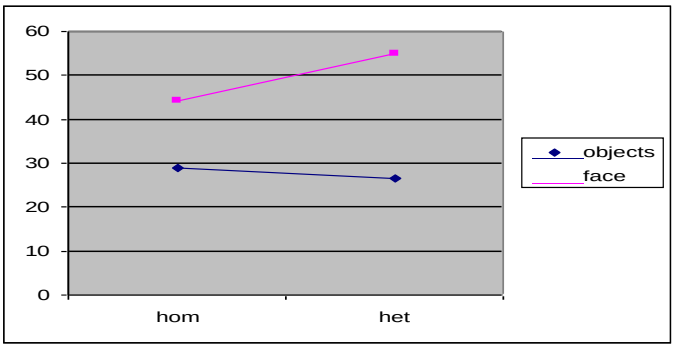

Figure 1: Inferential Graph

In summing up the results, the analysis of the data has shown that:

1. The main effect of the stimulus factor indicates that F(1,19)=38.07, p<0.001
   Object marginal means = 27.63, face marginal means = 50.1

This result underlines that faces are overall named significantly more slowly than objects.

2. Main effect test for context factor shows that F(1,19)=2.20, p<.15
   Homogeneous conditions marginal means = 37.03; heterogeneous conditions marginal means = 40.7

This result demonstrates that there is no effect of semantic context; in other words there is no significant semantic effect between homogeneous and heterogeneous conditions, despite the trend that the means for heterogeneous condition for faces were named more slowly that the means for homogeneous condition for objects.

3. The test of the interaction between stimulus and context factors gives F(1,19)=3.98, p=.060

There is no significant interaction between the two factors, although the effect of the stimulus factor is slightly different at each level of the context factor.

Once there was a trend, on the borderline, between the two factors (.060), there was run a t-test which showed again the approaching significance of the two factors' interaction: t(19df)=1.9, p=0.68

Discussion

The data collected, were analysed by employing a two factor (2X2) within participants ANOVA design. Homogeneity of variance, sphericity and assumptions of normality were met according to the analysis. It is unlikely that the differences between conditions to have arisen due to sampling error, so the null hypothesis cannot be rejected. The main effect of the stimulus factor is less than 0.001, indicating that it is significant, whereas the main effect for the context factor is 0.015, that is to say non-significant. Faces (50.1sec) were named overall significantly slower than objects (27.63sec), whilst the marginal means between homogeneous (37.03) and heterogeneous (40.7) conditions show that there was no effect of semantic context, that is to say that there is no significant difference between homogeneous and heterogeneous conditions, although the heterogeneous condition for faces took longer to be named by participants. On the other hand, the interaction between stimuli and context displays a trend (.060) as this is implied by the mean response time of the graph (Figure 1). The t-test which followed the analysis of the interaction has again exhibited a marginal significance between the two factors (0.68), meaning that the interaction is found towards the predicted direction. The face naming experiment although not actually significant, it means that would be worth replicated for future re-interpretation. Also, the faces condition is more significant than the objects – despite the small trend – and this is shown in their marginal means.

The time participants needed to name the homogeneous objects took longer than the heterogeneous ones, whereas the heterogeneous face naming took participants longer than the homogeneous one. That is to say that picture-word interference in face naming is greater than in object naming. In this way, the initial hypothesis is supported indicating that homogeneous objects and unrelated faces need longer time to be named than heterogeneous objects and related faces.

The experiment has shown that semantic context effects are different for object and face naming. In the first part of the experiment, objects from the same category doubled up naming latencies, whereas different category for objects provided only the half of latencies. The other way around was proved for face naming. Unrelated faces, i.e. different occupational categories, have provided results with higher latencies than the related ones, i.e. actors. The results show that picture-word interference provides homogeneous objects with more errors, than the errors from the heterogeneous one, whereas the homogeneous condition in face naming indicates less errors, than the heterogeneous one instead.

In a similar way, participants for the same semantic category for objects needed longer time to respond, thereby they have scored more errors (6) in a response time of 28.8sec, than the error score (3) to naming objects from different categories with a response time of 26.5sec. In an opposite way, face naming from a different occupational category took longer as much in response time (55sec) as in errors scored (9), from that of the same occupational category, both in time (45.2sec) and errors (7). The average mean error rate between object (0.22) and face naming (0.4) indicate that face naming error rate had almost doubled from the object naming one.

From the results section it is shown clearly that the hypothesis predicted in the introduction is supported. Participants needed longer time to respond as much to homogeneous objects, as to naming faces from a different occupational category. This hypothesis is also supported by both the Damian et al. (2001) and Vitkovitch et al. (2006) papers. In particular, the face naming process is maintained by the conception of the person identity nodes (PINs), implying that there is an actual interference between face recognition and name retrieval (Bruce & Young, 1986).

In view this experiment to be improved and in relation to Damian's et al. (2001) study that was replicated, there could be increased the number of blocks and the number of participants tested. Participants could be females as well, not only males, as the above experiment was concerned. Also, the design could include different stimuli and more semantic categories in each condition; every stimulus could be rotated in a computer monitor; there could be measured participants' individual reactions for each stimulus in each condition; the time could be measured in a more sophisticated and computerized way by stopping automatically between the intervals, when changing pictures, or if the participant feels unwell for some reasons. On the other hand, reactions like stuttering and cough or response delays could be measured not in relation to errors but in concert with the participant's effort to name the stimuli correctly. For this reason there may be introduced a wristwatch measuring the heart rate before, during and after the experiment is completed.

The face naming factor, as the one in relation to the Vitkovitch et al. (2006) study, which constituted the second part of the experiment, could be improved by testing the performance of both males and females separately. Male participants could be asked to name same and different category of male famous faces, whereas female participants to name same and different category of female famous faces. In turn, male participants could be asked to name homogeneous and heterogeneous female famous faces and female participants to name homogeneous and heterogeneous male famous faces. Could this experiment support the hypothesis that the semantic competition of picture-word interference is lower for males when they name male related and unrelated famous faces, in relation to a higher semantic competition of picture-word

interference for females when they name male related and unrelated famous faces? Or, could this hypothesis to work vice versa? In other words, could the semantic competition of picture-word interference of same and different category of famous female face naming for males to be rated as higher in relation to a lower one for females when they name same and different category female famous faces? Also, by looking at the relation between visual similarity and visual confusability, during face recognition, would the analysis lead to the predicted directions because of the errors scored by the participants?

Additional interpretation, in relation to object naming is found in respect to semantic similarities and influence interference (Damian et al., 2001). That is to say that the more the lexical entries, the more their semantic interrelatedness is activated (Roelofs, 1992). Kroll & Stewart (1994) argue also that effects of intelligence relate to the semantic context of the target task, indicating that semantic interrelatedness and interference are accounted for competition. Damian et al. (2001) claim that semantic category similarity demonstrates visual confusability as far as the target task is concerned. In this way, there is a competitive process taking place between visual similarity and semantic representation (MacKay, 1987). Morton & Patterson (1980) posit that this process leads to conceptual conflict which accounts for overlapping visual representation with semantic context and how the information is retrieved in return. Finally, according to the capacity theory, by Just & Carpenter (1992) individual differences in working memory storage among individuals show that storage and processing of information is related to semantic comprehension. Such individual differences interpret the way that working memory stores semantic information for both objects and faces as well as how the picture-word interference is involved when such information is retrieved from memory (Eysenck & Keane, 2003).

Face naming is considered to be an overall more difficult task than objects. This is what the experiment has shown in homogeneous/heterogeneous conditions for faces, as well as according to the errors scored. This is supported by both the papers mentioned and the research evidence up today. Some other reason for this prediction is because face naming occurs rarely than objects which people use more frequently.

Further research in this area could include the question whether episodic representation and semantic content may be related to retrieving information for objects and faces. In this way could be questioned whether the memory performance in retrieval tasks has a personal quality, meaning that it is influenced by the individual's personality and other characteristics, or is it affected by situational demands, as for example the wish to impress one's attention (Neisser, 1996). In concert with object and face retrieval (Eysenck & Keane, 2003), episodic representation and semantic content can show how an individual's motivation influences memory in everyday life. On the other hand, there could also be exhibited how episodic representation and semantic content refer to the motivational recall of stimuli and context, as well as to the extent of object and face recognition in relation to semantic competition and interference. Both above will be able to assist researchers looking for cheaters among those who fake amnesia by malingering the condition.

Conclusion

According to the experiment conducted for both object and face naming it is concluded that homogeneous objects need more time to be named than heterogeneous ones, whilst heterogeneous faces are named more slowly than homogeneous ones. That consideration supports the hypothesis that people need more time to name same category items than unrelated ones. Unrelated faces, on the other hand, are slowly responded than related ones. Objects are more easily recognized than faces, which is something that is related to frequency usage of both factors in everyday life. People retrieve picture-word information about objects more accurately than for faces and this is an obvious experience for almost anyone.

The errors participants had scored indicate that the picture-word interference has played a crucial role in the semantic competition between related/unrelated items and faces, as well as between information retrieval and semantic comprehension of the target task. The hypothesis for homogeneous versus heterogeneous items and heterogeneous versus homogeneous faces demonstrated a clear-cut interpretation about how people retrieve information that has been stored and how this information competes in relation to the semantic effect for both items and faces.

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