

Differences in Perceptual Reactivity According to the Nature of the Stimuli

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ABSTRACT

The objective of this research is to identify and compare the differences in perceptual reactivity depending on the stimuli to which the participants were subjected to the experiment. In this case, it is the auditory and visual stimuli. The hypotheses of this study are: 1. Perceptual reactivity is influenced by the auditory stimulus by recording a longer reaction time in the group to which this stimulus was applied compared to the control group. 2. Perceptual reactivity is influenced by the visual stimulus by recording a longer reaction time in the group to which this stimulus was applied compared to the control group. 3. Perceptual reactivity is more strongly influenced by the visual stimulus than by the auditory one. Procedure - we used the "Associative-verbal" test which contains 15 words of which 4 are reactive words (found in auditory and visual stimuli), 4 words are similar to the reactive ones, and 7 words are neutral. Participants were asked to associate each word with another representative of the basic one. Reaction time and unusual behavioral changes were recorded in a table. Participants were divided into 3 groups: control group, group to which an auditory stimulus was applied, group to which a visual stimulus was applied. The hypotheses were confirmed; there were statistically significant differences between perceptual reactivity to the auditory stimulus and perceptual reactivity to the visual stimulus.

Keywords: Sustainability, Perceptual Reactivity, Auditory Stimulus, Visual Stimulus, Reaction Time, Perceptual Image

Introduction

Perception is the identification and organization in human consciousness of facts, objects, and phenomena from objective reality that directly affect the senses as sensory information. In this context, the senses are categorized as analyzers. Compared to sensation, perception constitutes a higher level of processing and integration of information about the external world and our own "self." The superiority of perception lies in the creation of a synthetic, unified image in which objects and phenomena that act directly on the analyzing organs are reflected as integral wholes in their specific individuality.

Perception consists of knowing objects and phenomena in their entirety and at the moment when they act on the sensory organs. Unlike sensation, which renders an isolated attribute of an object, perception creates a global impression, a knowledge of objects in their entirety, in their real unity.

From a neurophysiological point of view, the formation of a perceptual image is based on the activity of the associative-integrative areas of the analyzers and the interaction between various analyzers. Depending on the specific mechanism that creates them, we can distinguish between monomodal perceptual images (containing information extracted and processed by a single analyzer) and multimodal perceptual images (containing information extracted and processed by several analyzers). Perceiving the same object through multiple analyzers is obviously more efficient than perceiving it through a single analyzer. Due to their relatively narrow functional specialization, each analyzer can only reflect reality in a fragmentary, one-sided way. Any concrete object, no matter how simple it may seem, has a multitude of aspects, properties, and relationships that cannot be captured in their entirety by a single analyzer.

Perceptions are defined as complex sensory processes and, at the same time, primary images containing all the information about the concrete properties of objects and phenomena under the conditions of their direct action on the analyzers.

Perception is a higher level of processing and integration of information about the external world. Thus, perception is understood as "the set of mechanisms and processes that determine the individual's awareness of the world and the environment based on information received through the senses." Like sensations, perception is finalized subjectively through an image. The perceptual image is similar to, but also different from, the sensory image. It is similar in that it contains information about concrete intuitive qualities. Like the sensory image, it is a primary image, which is realized "here and now," under the conditions of the action of stimuli and objects on the sense organs. It differs in that the perceptual image is rich in content, related to context, and meaningful. In the case of the primary perceptual image, its cognitive value is more important than aspects such as intensity or affective tone.

Duration-the perceptual image normally lasts as long as the object is in the perceptual field

The perceptual image has the attribute of visualization. Thus, when information arrives through channels other than the visual one, there is a tendency to transpose the information into a visual image.

The perceptual image also has the attribute of verbalization. Words play a very important role in perception. On the one hand, words are verbal integrators, as they are used to name perceptual experiences. On the other hand, words also have a regulatory function. Through words, perception can be directed and coordinated, especially in the case of observation.

F. H. Allport studied behavior in perception and synthesized it into six specific hypotheses (the "central states" theory) based on his needs, values, tensions, defensive reactions, personality, and experience.

The six specific hypotheses are:

- 1) The subject's needs and biological needs tend to determine what is perceived.
In one experiment, hungry subjects were shown ambiguous images, and an increase in "food" responses was observed after 3 hours, and even more so after 6 hours, along with an association of affective responses to "water" objects due to the intensification of the state of basic deprivation.
- 2) Rewards and punishments associated with object perceptions tend to determine what is perceived, and classical conditioning can lead to distortion of perception based on these associations; for example, if a student is shown a portrait of a stern, cold woman, with prior mention of education and punishment. After a number of repetitions, the experimenters measured the responses and found that the profile accompanied by the above mention was recognized more quickly.
- 3) An individual's values tend to determine the speed at which words associated with those values are recognized. In an experiment, subjects were first asked to complete a values questionnaire (Allport-Vernon); the questionnaire covered six types of values: theoretical, economic, aesthetic, social, political, and religious. Subsequently, each subject was presented with words on a tachistoscope, some of which were neutral and others belonging to their own value system; words in the second category were recognized more

quickly.

- 4) The value that an object has for an individual tends to determine its apparent size (see the classic experiment with the twenty-five-cent coin presented to poor and rich children). Because the aforementioned experiment was criticized on ethical grounds, another was used: middle-class students were chosen and, through hypnotic suggestion, were made to believe they were either very poor or very rich, and... Complexes seem to act quasi-autonomously, directing our perception of reality: the archetype behind each complex, as an anthropological constant, determines that different realities are undoubtedly compatible, although colored by the individual structure of a particular complex.

Indicators of complexes

The most important indicators of disturbed reactions are:

- 1) Associative blockage, i.e., effective paralysis of response. The subject is unable to respond to the stimulus word, stating either that nothing comes to mind or that too many ideas come to mind and they cannot stop.
- 2) A prolonged reaction time (RT) also indicates that the subject has been disturbed in his association process and that it took him some time to recover. Sometimes, however, the disruptive effect of a stimulus can last even longer than the moment when the subject can give a series of consecutive responses with a long RT, even though the disruptive stress radiates only to the first stimulus in the series, which can cause a fusion in interpretation. In order to determine which stimuli produced the complex reaction, the total average reaction time for all items is calculated. Then, the stimuli that have a TR significantly above the average or median are selected.
- 3) Incorrect or absent reproductions represent the inability to remember responses.
- 4) "Distant" responses, i.e., those with no apparent connection to the stimulus word. This is a behavior that camouflages unpleasant representations and emotions.
- 5) "Defined" responses. These are responses in which the subject attempts to define or explain the stimulus. This is a sign of an "intelligence complex," as Jung calls it, which is actually a variant of the inferiority complex.
- 6) "Predicate" responses are responses in which the subject directly expresses an emotion or attitude toward the stimulus. Their accumulation shows that the responses suggest a tendency to hide or compensate for
- 7) Egocentric responses are those that directly or implicitly involve references to oneself. E.g.: "my mother (S)-a mea (R)".
- 8) Perseverance is repeated in the presence of disturbances in several consecutive stimuli. It can lead to errors in interpretation.
- 9) Stereotypes - a word that appears in response to at least three different stimuli. In Jung's opinion, this type of reaction is always relevant to a specific problem of the subject.
- 10) Repeating the stimulus word is a type of "proxima" reaction that expresses the blocking of the associative process in its initial phase and the inability to further process the stimulus.
- 11) Responses in foreign languages, using multiple words, neologisms, rhymes, vulgarities, repetition of the stimulus word before responding, understanding.

Objective

The objective of this research is to identify and compare differences in perceptual reactivity depending on the stimuli to which the participants in the experiment were subjected. In this case, the stimuli are auditory and visual.

Hypotheses

1. Perceptual reactivity is influenced by the auditory stimulus, with a longer reaction time recorded in the group to which this stimulus was applied compared to the control group.
2. Perceptual reactivity is influenced by the visual stimulus, with a longer reaction time recorded in the group to which this stimulus was applied than in the control group.
3. Perceptual reactivity is more strongly influenced by the visual stimulus than by the auditory stimulus.

Procedure

The "Associative-verbal" test is used, which contains 15 words, of which 4 are reactive words (found in auditory and visual stimuli), 4 words are similar to reactive words, and 7 words are neutral.

Participants must associate each word with another word representative of the base word. The following are recorded

Reaction time and unusual behavioral changes are recorded in a table.

Participants are divided into 3 groups:

- Control group,
- Group that received an auditory stimulus,
- Group that received a visual stimulus.

The auditory stimulus consists of reading a text describing an act of robbery, and the visual stimulus is a two-minute video

showing the same crime involving a widower who was assaulted and robbed by two thieves.

The reactive words are: widower, assaulted, pension, robber.

Words similar to the reactive words are: alone, hit, income, robber.

The neutral words are: flower, car, tree, leaf, ring, child, table.

Participants

To conduct the experiment, we have three groups of 15 participants each.

The participants in the experiment are both male and female students between the ages of 20 and 52.

Experimental design

Design with three neutral groups

N₁ O₁
N₂ X₁ O₁
N₃ X₂ O₁

N₁ O₁
N₂ X₁ O₁
N₃ X₂ O₁

The groups are neutral ; participants are not selected according to any random The groups are neutral, the participants are not chosen according to any random formula. The participants are volunteers. We are talking about a quasi-experiment because we do not have random groups, but we do have a control group and multiple measurements.

Database (fragment)

Table 1: Database (fragment)

Nr.	Name	Group	Sex	Age	Stimulus word Widow	Stimulating word - Aggressed	Stimulus word - Pension	Stimulus word - Thief
1	IV	1	1	49	2.0	2.1	2.1	2.3
2	LCA	1	2	21	2.1	2.01	2.0	2.2
3	PQ	1	1	27	2.25	1.99	2.3	2.4
4	PLA	1	2	37	1.96	2.0	2.2	2.15
5	TL	1	1	28	2.31	2.3	2.35	2.4
6	RM	1	2	29	2.15	2.0	2.2	2.1
7	BC	1	1	25	2.0	2.15	2.1	2.25
8	NAM	1	2	26	1.8	2.2	2.0	2.15
9	NIM	1	1	21	2.1	2.05	2.1	2.05
10	MAL	1	2	27	2.3	2.1	2.15	2.3

The participants are volunteers. We are talking about a quasi-experiment because we do not have random groups, but we do have a control group and multiple measurements.

Complete table - Participant database

Continued table - Participants 24–45 and T-Test results

This page contains the second part of the participant table (from 24 to 45), as well as the results of the T-Test statistical analysis, applied to compare reaction times between groups:

- Control group vs. Auditory group
- Control group vs. Visual group

Values include mean, standard deviation, standard error, and statistical significance test results (t, df, Sig. 2-tailed).

Table 2: T-Test Results Tables

Group	N	Mean	Std. Deviation	Std. Error Mean
control	15	34.1467	4.171499	1.07702
auditiv	15	41.4333	2.19087	0.56577

Table 3: Independent Samples Test: Control Group vs. Auditory Group

Group	N	Mean	Std. Deviation	Std. Error Mean
control	15	34.2467	4.171499	1.07702
vizual	15	25.426	2.10509	0.54326

Table 4: Independent Samples Test - Control Group vs. Auditory Group vs. visual

Levene's Test F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI Lower	95% CI Upper
9.449	0.004	5.74	28	0.0	8.82067	1.53703	5.66897	11.97236
		5.74	22.201	0.0	8.82067	1.53703	5.6143	12.02703

Table 5: T-Test : Auditory group vs. visual

Group	N	Mean	Std. Deviation	Std. Error Mean
auditiv	15	41.1093	2.79877	0.723977
vizual	15	51.822	3.145859	0.812465

Table 6: Independent samples test - auditory vs visual

Levene's F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI Lower	95% CI Upper
1.95	0.174	-1.906	28	0.067	-7.82667	4.107264	-16.37197	0.71864
		-1.906	26.588	0.068	-7.82667	4.107264	-16.37797	0.72464

Interpretation

We applied the T-test to compare the reaction time between the group that received the auditory stimulus and the reaction time of the control group. For the Levene test, we have sig=0.09, $p>0.05$, so we will read the interpretation of the T-test for equal variants.

For the T-test, we have sig=0.034, $p<0.05$. It follows that the null hypothesis is rejected and the working hypothesis (hypothesis 1) is confirmed. We applied the T-test to compare the reaction time between the group that was given the visual stimulus and the reaction time of the control group. For the Levene test, we have sig=0.004, $p<0.05$, so we will read the interpretation of the T-test by unequal variants. For the T-test, we have sig=0.002, $p<0.05$. It follows that the null hypothesis is rejected and the working hypothesis (hypothesis 2) is confirmed. We applied the T-test to compare the reaction time between the group that received the auditory stimulus and the group that received the visual stimulus. For the Levene test of equality of variances, we have sig=0.174, $p>0.05$, so we will read the interpretation of the T-test for equal variants. For the T-test, we have sig=0.174, $p>0.05$. It follows that the null hypothesis is confirmed.

Conclusions

Two of the hypotheses were confirmed in this study. Auditory and visual stimuli influence perceptual reactivity through longer reaction times.

It should be taken into account that the groups used have a limited number of participants. It is possible that with a larger number of participants, the third hypothesis would also be confirmed, namely that perceptual reactivity is more strongly influenced by visual stimuli than by auditory stimuli. A respondent manifests an emotional deficiency or emotional void, displaying excessive emotions and often in an affected tone.

Unusual behavioral changes were recorded more frequently for reactive words and words similar to reactive words in the groups that were exposed to auditory and visual stimuli, which could mean that these stimuli are disruptive factors in perceptual reactivity.

Limitations of the research

The environment in which this experiment was conducted did not provide optimal conditions for all participants to concentrate on the stimuli that were applied to them.

References

1. Mihai Aniței. Fundamentals of Psychology. University Publishing House. 2010.
2. Mihnea Costoiu, Cristina Roșca, George Cristian Lăzăroiu. Smart Citizens for Smarter Cities In: "Holistic Approach to Decision Making for Smart City Design". 2021.

3. Oana Mariana Ciuchi. Education and Social Integration of the Human Individual. Review of Artistic Education. 2021. 22: 310-317.
4. Teodora Daniela Chicioreanu, Irina Cismasu, Marin Alexandru, Osiceanu Sanda. Entrepreneurial skills. Bucharest Publishing House. 2015.