

Phonetics and Phonology: An Analysis of Effects of Phonological Similarities on Working Memory

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Abstract

The current paper assumes the very interesting phenomenon that is “effects of phonological-similarity on working memory”. Phonological-similarity effect is a whole term that asserts that to recall dissimilar items from working memory is much easier than to recall similar items. To prove this assertion, we will do a research on the students of university level. We are using Coltheart’s model. There will be two trials, list of similar items will give to students for ten second and then ask them to recall the words and write them on the page. The same procedure will do again with the list of dissimilar items. The data will analysis through statistical techniques. To put our results in a nut shell it is clearly stated that dissimilar items enchase the accuracy of retrieval and the very word “similar” in the “phonological-similarity” must be “re-considered”.

Key words: phonetics, phonology, phonological similarities, working memory

INTRODUCTION:

The current experiment is centered around the effects of phonological similarity on working memory. Phonological items can be similar or dissimilar. Our aim is to check that which items have major effect on

working memory and also examine either it is easier to remember similar or dissimilar items during working memory. The concept of phonological-similarity effect exists when letters and words that sound similar they confused us. “Recent experiments have shown that placing dissimilar items on lists of phonologically similar items enhances accuracy of ordered recall of the dissimilar items (Farrell, S., & Lewandowsky, S. (2003)”. *Journal of “Experimental Psychology: Learning, Memory, and Cognition*, 29,838–849) Two explanations have been offered for this effect: an encoding explanation, in which items similar to current memory contents are given less encoding weight and offer less competition for recall: and a retrieval explanation, which suggests that the long-term similarity structure of the items leads to dissimilar items being more distinct on mixed lists”. The importance of working memory can be judged easily in our everyday cognitive activities and works: e.g. reading an article and books, rearranging the room’s setting in your mind and mentally calculates the amount that you want to give someone. All these tasks encompass various phases “with intermediate results that need to be kept in mind temporarily to accomplish the task at hand successfully”. Baddeley & Hitch, 1974; Daneman & Carpenter, 1980 had defined “working memory” as the discipline that comes under the field of cognitive psychology to describe that the main purpose of working memory is to maintain the “task-relevant information” whenever the cognition is required for everyday tasks. It is also recognized like “the hub of cognition (Haberlandt, 1997, p. 212)” asserted that working memory as “perhaps the most significant achievement of human mental evolution (Goldman-Rakic, 1992, p. 111)”. There are different metaphors which are used for working memory such as “workspace” or “blackboard” metaphor, the “mental energy” or “resources” metaphor, and the “juggling” metaphor”.

While dealing with the nature of working memory firstly we come across the fact that why people have diverse “cognitive skills” and aptitudes and why they have different yardsticks to achieve the real world tasks successfully. The results of different researches in this domain show that “the amount of information that can be held accessible (Daneman & Carpenter, 1980), and that these differences predict general intelligence (as measured by standard IQ tests), verbal SAT scores, and even the speed with which a skill such as

computer programming is acquired (Kane & Engle, 2002: Kyllonen&Christal, 1990)".

Hypothesis:

Similar items enhance the accuracy of retrieval.

Dissimilar items do not enhance the accuracy of retrieval.

Literature review:

A blossomy result in the investigation of the working memory to recollect composition of phonologically homogeneous words is comparatively more inconvenient than to recollect a lay of phonologically opposite words, which is the famous phonological-similarity impact (Conrad & Hull, 1964). This survey reflects that the potential of knowledge detention in our working memory accumulation almost on phonological style of the information which is to be retained. The more similar words are difficult to be remembered while the words which are not similar or undistinguishable are easy to learn and comprehend. However, the Chinese sections have the innate guidance that to immediately induce a set of informal catchphrases in the objects merchandise on television. There is also an intimation staging that pronouncing of oral information generally intensifies our ability to remember the items (Tehan, 1999, Fallon, Groves). That's why it is very important that we should have complete apprehending about the operation of the working memory model (Baddeley, 1992).

In the memory work which has been done by Saito (1998), he delineated that incantation of a phrase or sentence may also have some benefaction to contributors. Recollect production (Pennington & Ellis, 2000). In the memory work which has been done by Saito (1998), he delineated that incantation of a phrase or sentence may also have some benefaction to contributors. Recollect production (Pennington & Ellis, 2000). Analyzing the applicable literature, there are most of factual tasks which are related to this particular problem in the region of language investigation: apprehension and presentation (Sevald & Dell, 1994: Slowiaczek, McQueen, Soltano, & Lynch, 2000: Soto-Faraco, Sebastián-Gallés & Cutler, 2001)

Regarding working memory, one of the important concepts to understand is that it is limited in quantity, and by quantity it means that we are unable to stock and employ unlimited amounts of

information. Hence, the types of considering and memorizing tasks we can overcome will be compelled by working memory resources. Working memory is also limited, to some extent, the types of things we can deal symmetrically. While there are some categories of tasks that can be accomplished at the same time, other categories of tasks contend for the same resources residing within the working memory phenomenon and, hence, overlap each other. "Working memory is critical because it construct abilities in many other departments such as reasoning, learning and comprehension. In current most description of the working memory system, (Baddeley, 2007) even attempts to use his model to account for consciousness".

The collection of words that produces similar sounds while pronouncing are arduous to evoke on an instant sequential reconsider problem than roll of words that consists of phonologically dissimilar pieces (Conrad & Hull, 1964, Baddeley, 1966:). Most recent archetype of direct serial recall (Brown & Hulme, 1995, Baddeley, 1986 Burgess & Hitch, 1992, Nairne, 1990: Schweickert, 1993) announces that serial pattern is arduous to maintain when all items which are considered in the list are phonologically attached to one another.

In the research of phonological similarity, recollect has most often been arranged in names of the number of ingredients recollected in accurate serial status. Nevertheless substitute composing processes are present. "The recollection of word is generally scored by calculating the numbers of list words remembered, despite of the arrangement in which they are recollected (e.g. Watkins, Watkins, & Crowder, 1974: Crowder, 1979). The second process composes exact locality, which can be more confused. Directly calculating the amount of transpositions is not reasonable if there are distinctions in recollecting of words. One resolution is to arrange the amount of items recollected in accurate location as a quantity of the number of words remembered despite of status (Wickelgren, 1965: Poirier & Saint-Aubin, 1995: Saint-Aubin & Poirier, in press)".

There are salient justifications for reasoning about actual serial recollect according to words and correct arrangement of section. For instance, the lack of phonological similarity impacts under repression or a short custody gap has taken many authors to assume that phonemic sketches only encourage the recollection. "After that time, either decomposes or disruption is supposed to lessen the

stability of the indication to levels where it cannot maintain memory (Baddeley, 1986: Tehan & Humphreys, 1995)".

Phonological similarity effect is of utter importance but the studies investigating this effect numbers to only six, studying its levels. Thus out comes through their investigations were always controversial, occasionally a helpful results are observed according to the studies of Gathercole, Gardiner and Gregg 1982, Wickelgren, 1965: some results show them to be neutral (Poirer and Saint-Aubin 1996, Drewnowski 1980) and sometimes the results show a pernicious effect (Drewnowski 1980, Coltheart 1993)"

Phonological similarity makes itself the most concerning dimension regarding discrimination between these studies. Results that showed helpful property computed "phonological similarity in terms" for symmetrical modes. The studies that showed pernicious effects computed phonological similarities in terms of grammatical overlap without any category membership.

The study which showed a neutral or untrue consequence consumed a combination for production un production and substances in their parallel kinds. Analyzing the results, a witness could come to the result that a beneficial effect of phonological similarity occurs only as a result of poesy items used".

Observing the results of the studies, we explored the substance and accuracy scoring of the phonological similarity, and the similarity was computed in the following ways:-

The substances form poesy categories or the substances having high grammatical overlapping but they do not originate from any single poesy category. From witness's point of view it seemed that phonological similarity effects would be different for two lists. The witness presupposed a contrast in item recall among the two matching list and was expecting an impact on correct-in-position effects. There was an uncertainty in differential order errors besides it was expected from both types to produce transposition errors.

Methodology:

Our aim is to examine; either there is any "effect of phonological-similarity on working memory"? To accomplish our aim 30 students from University of Sargodha aged (18-22) both male and female are selected as a sample. There were two pages comprised of similar items and dissimilar items. There were two trials. The list of similar items

is given to each student for 10 second and then asked them to write those words. Then same procedure is repeated for another time and asked them to write the remember words from dissimilar items. SPSS is used for the analysis of data through the application of correlation. Correlation is used to check how much data correlate to each other's.

Result analysis:

As it is mentioned in methodology, that through SPSS, our data was analyzed and then formula of correlation was applied. In Correlation, the minimalist out puts with – sign are considered more significant or efficient. Here we postulate the results of both the dissimilar items and similar items by applying a correlation.

Correlation of similar items

Correlations

		VAR00001	VAR00002	VAR00003
VAR00001	Pearson Correlation	1	.393	.554
	Sig. (1-tailed)		.103	.313
	N	22	12	3
VAR00002	Pearson Correlation	.393	1	.596
	Sig. (1-tailed)	.103		.297
	N	12	12	3
VAR00003	Pearson Correlation	.554	.596	1
	Sig. (1-tailed)	.313	.297	
	N	3	3	3

Correlation of dissimilar items

Correlations

		VAR00001	VAR00002	VAR00003	VAR00004	VAR00005	VAR00006	VAR00007	VAR00008
VAR00001	Pearson Correlation	1	-.006	.018	.048	-.306	-.277	. ^a	. ^a
	Sig. (1-tailed)		.487	.462	.401	.089	.274	.	.
	N	30	30	30	30	21	7	1	0
VAR00002	Pearson Correlation	-.006	1	.005	.114	.067	.164	. ^a	. ^a
	Sig. (1-tailed)	.487		.490	.273	.387	.363	.	.
	N	30	30	30	30	21	7	1	0
VAR00003	Pearson Correlation	.018	.005	1	.146	-.210	-.410	. ^a	. ^a
	Sig. (1-tailed)	.462	.490		.221	.181	.181	.	.
	N	30	30	30	30	21	7	1	0
VAR00004	Pearson Correlation	.048	.114	.146	1	.108	-.213	. ^a	. ^a
	Sig. (1-tailed)	.401	.273	.221		.321	.323	.	.
	N	30	30	30	30	21	7	1	0
VAR00005	Pearson Correlation	-.306	.067	-.210	.108	1	.240	. ^a	. ^a
	Sig. (1-tailed)	.089	.387	.181	.321		.302	.	.
	N	21	21	21	21	21	7	1	0

VAR00006	Pearson							
	Correlation	-.277	.164	-.410	-.213	.240	1	.a
	Sig. (1-tailed)	.274	.363	.181	.323	.302		.
	N	7	7	7	7	7	7	1
VAR00007	Pearson							
	Correlation	.a	.a	.a	.a	.a	.a	.a
	Sig. (1-tailed)	.	.	.	.	.	.	.
	N	1	1	1	1	1	1	1
VAR00008	Pearson							
	Correlation	.a	.a	.a	.a	.a	.a	.a
	Sig. (1-tailed)	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0

Now it is evident that the result of dissimilar items is -.006 that is considered efficient in correlation but the results of similar items assert positive in numbers that is .393, because in correlation the result move from negative to positive to highlight how much the data correlate with each other. Our results clearly show that the correlation between dissimilar to similar is very much and the results of dissimilar items are in favor of correlation having with negative and smallest digits. The result is written n this form. $-.006 < .339$.

DISCUSSION:

After complete analysis of results, it is assumed that there must certain factors that support our results. It is cleared in introduction that we are going to examine the phenomenon that does phonological similarity affect the working memory? If it does, then in which perspectives? Our results postulate the fact that dissimilar words are easy to remember rather than similar words and the results figured out this reality very clearly.

Now we will spot light on those factors for which dissimilar words remain in working memory easy as compare to similar words. The factors are recognition (association), duration and capacity.

Recognition (association):

While examining the result it is evidence that dissimilar words are remembered more than similar words and the reason is that of recognition or association. Recognition means acknowledgement or realization and identification. In the list of dissimilar words there are certain words which are more remembered and most of the participant retrieval those words e: g books, kitchen, college, school, university, park, bank and hotel. All the participants chose these for

and retain in their working memory because of the acknowledgement or recognition, because directly or indirectly the participants are associated these words.

On the other hands the similar words list contains words like at, ap, ab, ad, an and in the process of working memory it becomes hectic for participants to remember these words that's why they perform worse in this trial.

Duration:

In working memory the words remain for second and similar items contain eight final consonant, eight rhyme sets and these rhyme sets words confused the participants that's why they are remember less. While dealing with dissimilar items the words are easy because they are use in routine life so it became easy to remember.

Capacity:

When we talk about the capacity in working memory the capacity of storing the words are limited to 7 plus and minus two items in a few seconds. It is admitted that most of the words in similar lists were composed of two or three syllables but in the trial it become hectic to memorize those words. On the contrary the dissimilar items are just seen through bird eye view and become easy to retrieval.

To support our argument we will discuss our points with the coordination of working memory. The points are as follow:

1."Basic unit and representation in working memory"

What are the units or mechanism in which info sustain? The information is encoded according to duration and capacity. The conventional perspective of human memory provides a classic description of primary mechanisms which are encoding, maintenance, and retrieval. What do you know about retrieval mechanism? The information in the working memory is supposed to be attainable comparatively speedily and without any hard struggle. "How the knowledge displayed in short term memory? Rather a depiction style for contradictory modes of task info, for instance oral and visuo-spatial, alike and different? As for the depiction problem, the conventional prospect intensifies "speech-based codes which are acoustic, phonological, or verbal".

2."The control and regulation of working memory"

How short term memory is managed and modulated the information in it? What sorts of modes of info is sustained and which is not? Is the limitation and adjustment for short term memory grasped through “central control structure” for example, the central executive system? If it happens, then what functions assign to “central control structure”?

When the modern working memory research was started, the controversy for organize and directive have been contemplated for chief significance. A concept of "**control processes**" is introduced in “Atkinson and Shiffrin's (1968) model of human memory”. A direct procedure for the replica, though, is confined for the tangled in actual cognition, like practice, indulgence or investigate yard sticks. To difference for a conventional, storage-intended concept of working memory, the working memory is regarded a more procedural-intended design and is occasionally conceived like a "**work place**" and "**background**" for a particular mental process that their influential action or short-term propulsive happen..

The best response for the "**control and regulation**" probe for the presumption to basic manage organization such as “central executive”, which "**Baddeley and Hitch**" done for the distinguished replica consists of many constituents. Phonological loop composes of phonological stockpile but system of production is also involved in it.. The system of production accumulates influences the sounds store in depictions for a small stage of moment. The **articulatory rehearsal system** empowers us to openly or secretly repeat the data or material. The **visuospatial** sketchpad non-permanently sustains and keeps visuo-spatial knowledge. This is the process which enables us to make the pictures which are visible to us, revolve them into our memory, changes words into pictures and so on.

3."The Unitary Versus Non-Unitary Nature of Working memory"

Is short-term memory a composite frame, or does it comprises of numerous divisible sub-procedures? If its end product, then which are the sub-processes of short-term memory and how will they communicate with each other? What verification and conceptual reflections, explain?

The problem of either short-term memory is the composite or non-composite has been a rise of dispute in the short-term memory literature. With-in the non-unitary group, divergent investigators separate short-term memory in distinct techniques, and there has been a bit harmony according to the amount of sub-procedures and the creation of every sub-process. Some other predicates that working memory consists of or sub-processes or varieties of codes or delineations in working memory are lexical, auditory motor, semantic, syntactic, and so on.

4."The Nature of Working Memory Limitations"

Which are the procedures that compel the power of short-term memory, for example inadequate stock of activation, speed of organizing, decomposing, obstruction, skills?

The chief procedures of the working memory are encoding, maintenance, and retrieval. Working memory indicates possessing route of existing mental procedures and short-lived memory. One postulate is that this structure of memory contains various domain-specific elements. Encoding is the procedure of changing information or any instruction into a specific form or shape. Maintenance is the sustaining of information into working memory that is how the information can be kept in short-term memory for a little period of time. While the process of retrieval occur when information is getting out of the memory. The retrieval sections are incentives that support the procedure of retrieval. This question covers the stamp feature of working memory, recognized or deliberated for about a century - the extreme restrictions in its potential. In his standard book, William James illustrated that, unlike the effectively extensive quantity of knowledge that can be preserved in an individual's "**secondary memory**" only a little quantity of information can be maintained awake at one time in one person's "**primary memory**".

5."The Role of Working Memory in Complex Cognitive Activities"

In what perspectives short term memory exposed for the interpretation of multipart conceptual functions, for example verbal communication interpretation, logical reasoning, rational calculation, and considering the resolving difficult problems? It provides task-relevant information which is dealing with our daily routine tasks, for

example the process of calculation in dealing with any mathematical problem and the arrangement of furniture when you are going to settle in your new house. It presumes a central executive for difficult commitments and control procedures, and a numerous secondary following procedures, which are considered to be included in particular processing. This question demanded the correspondents to highlight how their specific versions display this reconciliation among remembrance and consciousness and how working memory is involved in the production for complicated conceptual rather rational problem. It is very much cleared in the beginning that working memory helps us in our daily routine works rather mental or logical task it provides task relevant information for conceptual tasks.

6."The relationship of Working Memory to Attention and Consciousness"

How these three words attention, consciousness and short term memory relates to each other's? Are they belonging to the one form? In what perspectives short term memory correlate to perception or attentiveness?

It is widely accepted that all these terms are synonymous to each other's because the main purpose of working memory is to provide task relevant info to a daily cognition tasks and in these task attention is required as well as attention and awareness that's why they all are same at a one.

CONCLUSION:

To put our results and discussion in a nut shell, it is cleared that dissimilar items are easy to remember in working memory as compare to similar items. The reasons are very much cleared because the overlapping of prosodic features hurdle while remembering the similar items. On the other hand dissimilar items have some cognition and association with the participants directly or in directly that's why they are easy to remember and the retrieval become easy. It is suggested that the very word "similarity" in "phonological-similarity" must be re-considered.

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