

Social Influences on Lexical Access

Austin Che

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Abstract

A consistent finding in social psychology is that in brainstorming sessions, people are less effective when in groups than alone. However, applying this to a brainstorming task involving lexical access, we find no difference between people working alone and pairs working together. Differences are observed between how people use language to coordinate and work off each other in the pair condition, but these differences are apparently not large enough to have a significant impact on the final results of the brainstorming sessions. This may be due to the inherent nature of language as a social process, to make language tasks more immune to the social effects of groups.

1 Introduction

One essential step in the process of producing speech is to find the right word that fits the concept we wish to convey. We have at our disposal

some mental representation of our vocabulary, often called our internal lexicon. The process of activating a word in our internal lexicon is called lexical access. Much work has been done on experimenting with lexical access in language comprehension ([1], p. 102). Lexical access is however also critical for language production. We may know a concept and even some attributes about a word, but not be able to come up with the actual word. This is sometimes called the tip-of-the-tongue phenomenon. Other variables can also influence the lexical retrieval of a word. Specifically, this paper will bring a well studied phenomenon in social psychology to psycholinguistics, and explore how social influences can affect coming up with words in speech production.

A primary point Clark makes about language is that it is a social process and is a joint action. “Language use, therefore, embodies both individual and social processes” ([2], p. 3). One use of language as a joint action is in brainstorming. All parties involved must coordinate a discussion with the ultimate goal of producing quality ideas. The process of brainstorming and coming up with ideas is a bit mysterious and not well understood. However, one surprising but very consistent finding of previous research is that people tend to be more productive in their brainstorming when alone than in groups [3].

The typical experiment usually goes as follows. In one condition, individuals are asked to brainstorm on some subject, for example to come up with words with a certain property. In another condition, people are formed into groups and must brainstorm on the same topic.

To get the nominal group, you pool all the ideas that individuals come up by working alone. One can then compare this nominal group with the second condition, the interacting group. If the primary purpose of language is to be a social process as Clark says it is, then one would not expect the interacting, social group to show worse performance than the nominal group, especially on a language task. However, as already mentioned, previous results have shown that people consistently do worse when in groups.

I tried to replicate some of these results by running subjects on the very language related task of lexical retrieval: trying to come up with words that fit a given criteria. I ran subjects both individually and in a social group of two people. The main objective in this study was to compare and contrast how language is used differently while being alone or being in a group when coming up with new ideas. It was expected that the results would match the previous patterns found in social psychology, and that pairs would show worse performance than those working alone. I further expected to find differences in style between how people used language in the case of working alone and working with a partner, that followed the guidelines that Clark gives for using language cooperatively.

2 Methods

I told all subjects they were playing a game where the objective was to come up with as many words as possible. They would be given a

- A: Food items beginning with the letter 'A'
- B: Places beginning with the letter 'B'
- C: Games beginning with the letter 'M'
- D: Entertainment beginning with the letter 'H'

Table 1: Experimental Conditions

category and a letter and would have to come up with as many words fitting in the category beginning with the given letter. They had to write down their words on a piece of paper and to also say out loud the words and any thoughts that they may have, as I recorded each session on tape. Twelve subject were run on four different categories. The categories are shown in Table 1.

Each subject was run on every one of these categories either individually or with one other person in a pair. Everybody had two minutes for each category. In the pair condition, each person wrote down the words that they came up with, but they were told that their main objective was to get as many words as they could combined. I told subjects that they could talk to each other in any manner that they wish, to work together to come up with words.

The way that the experiment was designed is shown in Table 2 (S denotes single subject, Px denotes paired with subject number x). All four of the above categories had six people do them individually and 3 pairs of people working jointly. This setup allowed for me to work with groups of three at a time, and no two people are paired together

		Conditions			
		A	B	C	D
Subjects	1	S	S	P3	P2
	2	S	P3	S	P1
	3	S	P2	P1	S
	4	P5	S	S	P6
	5	P4	S	P6	S
	6	S	S	P5	P4
	7	P9	P8	S	S
	8	S	P7	S	P9
	9	P7	S	S	P8
	10	S	P12	P11	S
	11	P12	S	P10	S
	12	P11	P10	S	S

Table 2: Experimental Setup

more than once.

Subjects in each triplet knew each other at least as an acquaintance, so there were no strangers in each paired group. Some were roommates and there was even a husband and wife pair. All subjects were between ages 17 and 30 and they were all fluent English speakers.

		Conditions			
		A	B	C	D
Subjects	1	7	12	7	9
	2	8	8	4	5
	3	9	13	10	11
	4	3	11	3	2
	5	5	10	5	5
	6	5	10	8	6
	7	7	11	6	6
	8	4	5	6	5
	9	11	10	7	13
	10	5	N/A	4	7
	11	10	16	2	11
	12	3	N/A	2	7

Table 3: Number of Items Per Run

3 Results

I counted the number of items that each person wrote down in each trial run, whether working alone or as a pair. The raw data for the number of items come up per person in each trial is shown in Table 3. One pair was not able to be tested together.

I did not tell people what is a valid “word” and I in fact accepted everything that was written down. For example, some people wrote

	Conditions			
	A	B	C	D
Singles	6.3	11.50	4.67	7.83
Pairs	6.5	9.25	6.00	6.67

Table 4: Averages

down words in other languages, or words that only barely fit into a given category. I accepted everything so I would not be forced to make any judgment calls as to whether a word was really appropriate for a given category. Averaging for each category the scores for the singles and the pairs, we get the results shown in Table 4.

The differences between the averages for each of the categories does not show consistent results towards either the single condition or the pair condition. For some categories, people did better alone, while in other categories, people did better in pairs.

Note that the averages are a bit skewed in favor of singles due to duplicate words in the lists. What we really want is probably the number of unique words that people get. The list for pairs did not include duplicates so even if both people in a pair would have come up with a word if working alone, they would only get credit for one item as a pair. The problem with removing duplicates is that it was not immediately obvious the best way to deal with them. Ideally, we would want to compare the scores for each pair with the scores of every other two people working alone combined. To make it simple, we just

have the average of the total number of items per person, regardless of the actual words that each person wrote down.

Another way of analyzing this data is to compare the numbers across categories. We can first get an idea for the relative difficulties of the categories by looking at the averages for each category. Although this was not done here, it should be relatively straightforward to normalize for the difficulty of each category, and finding whether each subject did better working in a pair or working alone.

4 Discussion

4.1 Comparisons

Although previous research consistently showed disadvantages for those working in groups, that was not the result found in this experiment. There may be several explanations for this. Researchers had put forth many hypothesis to explain why groups appear to be at a disadvantage. The dominant hypothesis appears to be production blocking. Those in groups often have to hold on to their ideas until there is free air time for them to speak up [4]. One method to get around production blocking is to allow for the parallel generation of ideas. For example, in the Nominal Group Technique individuals brainstorm separately on to slips of paper that are then shared between everyone to hopefully get some of the benefits from a group environment. This same approach was taken in this experiment by giving each person a separate piece of paper and pen to write down their ideas. But un-

like the Nominal Group Technique, I allowed and encouraged verbal communication between people as they did their brainstorming.

Another hypothesis that been put forth is that the cognitive inertia in groups slows down the brainstorming process. This is the idea that at any one time, only one train of thought is followed by the group as a whole. I only found a minimal amount of inertia with a couple pairs. Most of the time, pairs would jump quite easily from one area to another. In fact, I found that pairs benefitted from being able to hear other people's interpretations of the categories. Since I chose the categories to be very broad, in most cases, the interpretation of each category was left up to each individual. Some people, for instance, only thought of cities for the places category, while others came up with words like bar, backyard, or barn. Others were ever more creative and came up with things like a barracuda's mouth. Pairs therefore had the advantage in being able to be pushed on to different tracks of thinking, and this did not hinder their ability to jump off to a different track, if they hit a dead-end.

4.2 Lexical Access

In this task, lexical access was made the central objective for all the subjects. They had to find specific words within their mental lexicons. Why did some people do better than others on this task? The subjects all could be considered to have the same lexicons, with the same communal lexicons, as the groups were pretty homogeneous. Most were a part of the same communities, so they should have shared the same

size and types of lexicons. Theoretically, then, everyone should have retrieved about the same words instead of the quite different lists that I got. It is certainly not the case that most people wouldn't recognize a word as belonging to a certain category if told a word they hadn't written down. For example, an interesting case is the formation of new words using inflectional morphemes or by adding words to the end. No one wrote down both apple and apples for the food items category, yet no one would deny that both of these are words. Many people did write down variations on apple such as apple pie, apple sauce, etc.

We know that lexical access, the retrieval of appropriate words, is not an easy task, even when we know the word is somewhere in our mental lexicon. Some people, however, could do this task better than others. People had different strategies for retrieving words. One person kept repeating the words that he already had written down to help him think of similar words, but for most people, they just sat there until they thought of a new word. Very few people went about the task systematically by trying letter by letter to think of words. There have been theories about how we activate appropriate words. For example, the Bock and Levelt spreading activation model includes connections at various levels between words including at the conceptual and sound levels ([1], p. 114). Two main factors that influence whether a word will be retrieved are the frequency of the word and whether a similar word had just occurred.

As an example of frequency, every single person or group for the

food items category came up with the word apple as either the first or second word in their list, and usually within the first 3 seconds. Apples are arguably the most frequent food item that we see beginning with the letter 'A'. Similarly, for places, the first word that is come up by either individuals or pairs varied between Boston and Baltimore. For games, the first game that comes to mind for most people seems to be Monopoly, and for entertainment, Hollywood was the winner.

Also, people usually get words in runs of related words. There are two main ways that words can be related: either semantically or phonologically. We can activate similar words either by meaning or sound. In this task, they needed to find words that matched two criteria: they must fit in a certain category, and they must begin with a certain letter. The first deals with meaning and the second deals with phonology. When told to think of words beginning with the letter 'A' in the category food items, do people first think of all food items that they know or all words beginning with the letter 'A'? A surprisingly large number of people put down 'ants' as a food item beginning with the letter 'A'. Ants is a pretty common word, and although it probably isn't a very common food item, most people still wrote it down. If just told to write down food items with no other limitations, I doubt anyone would put down ants. In this case, people thought of words beginning with 'A' and then tried to fit it into the food items category, so the sound criteria dominated over the semantic criteria.

If we look at the lists that people wrote down, we also see evidence

for activation of similar sounding words rather than similar meaning words. For example, there was the following exchange:

Subject 9: Apple. Apple pie.

Subject 7: Apple sauce.

Subject 9: Apple ice cream.

...

Subject 7: Altoids

Subject 9: Albacore tuna

Subject 7: Albatross

In the first part, they worked off the base word apple. In the second part, they start from words with beginning sounds of 'al' and then moved on to 'alba.' The words in the first part have some semantic relationship, but probably are more similar in their common word 'apple.' The words in the second part have almost no semantic relationship to each other.

Here is another dialogue between pairs. While the words have some semantic connections, the more prominent similarities appear to be the common sounds.

Subject 7: Back

Subject 8: Backyard

Subject 7: Back woods. Bathtub

Subject 8: Bathroom

There was only a couple examples to support of the notion that the subjects used semantic relationships do aid their lexical search. As one

example of semantic related words occurring one after another, on the places category, one pair was stuck on naming cities. Then one person said “baseball game” and the other immediately said “ball park.” However, this was extremely rare, What was much more common is having words that are related not by meaning but by sound.

Those working alone also worked off their own words. One person wrote down: men’s basketball, men’s baseball, men’s crew, men’s tennis, and men’s volleyball, one after another, for games beginning with the letter ‘M.’ These words are both semantically and phonologically related. Another subject got the list Hunter Hemsley, Hunt for Red October, Holly Hunter, and Helen Hunt in quick succession. The primary relationship between the words in this list is that they all include ‘hunt.’ They are not all the same type of thing. For example, this subject jumps quite quickly from movies to actresses. So, both people working by themselves and people working in pairs, showed the same type of patterns in the words that they retrieved.

4.3 Social Processes

Although people tended to retrieve words similarly in both as a pair and individually, there were different social processes at work. In the pair condition, people were usually more animated. I saw more gestures and eye contact towards the other person. However, even when they are working by themselves, people act socially. For example, they would laugh at their own words when the words were a bit of a stretch. People while working alone would put in filler words as they talked

to themselves. It isn't that they are trying to hold their spot in the conversation. In some cases, they appeared to be uncomfortable with the silence. There may have been an effect of me as the experimenter being present, as they tried to fill the silence with something. When in pairs, they could leave it up to their partner to say something, and there was more silence present in the paired conditions.

People may have found it strange to do the task individually, since they were basically talking to themselves, in a society where language is normally used to talk to others. Some people tried to get me involved, either by asking questions, or looking at me, and making it into more of a social situation. This is the difference between language use in a private setting and language use in a personal setting ([2], p. 5). Language is primarily used for social communication so it was predictable that people would show a bit more comfort with their use of language in the social condition.

When people perform the task alone, the things that were said aloud were almost exclusively words that they wrote down. When in pairs, people were a bit more likely to say other things to help the process of brainstorming. For the entertainment category, one person said things like, "what about movies?" asking their partner questions. However, many of the pairs stuck to the same format as their single person brainstorming. That is, they only rattled off the words that came to them, and did not interact with the other person too much.

If everything above is true, then why didn't people do much better in the pair condition? There are also disadvantages to working in a

group. First, some amount of coordination is necessary for the pairs of people to generate lists in parallel. At the least, they needed to avoid saying words at the same time. Sometimes people would complete their partner's thought, such as in the following:

Subject 12: Animal..

Subject 11: Animal crackers!

There are also non-obvious things going on in social groups. In joint actions, participants have different types of goals ([2], p. 34). In this experiment, their domain goal was to get as many words as possible, but they may also have interpersonal goals while working as a pair. For example, they may have tried to maintain respect and not lose face by trying to contribute at least as much as their partner. In the case of subjects 8 and 9, subject 9 was getting word after word, and I could see subject 8 trying real hard to come up with words himself. The end result was that there were some pretty wacky words written down such as "hamster racing" or "hamburger tossing," things that no one else wrote down. This may be a result of trying to restore equity. Two people when placed together into a joint commitment have desires to maintain equity as well as maintaining face ([2], p. 290). In this situation, it may have helped the less contributing partner to think up of examples. In other situations, the opposite effect may have occurred. That is, the person making more contributions may stop thinking as hard and contributing as many words, to allow for the other person to come up with words, to maintain some balance between the two in terms of equity.

5 Conclusion

Whorf believed that our thinking may depend on how we use language. Especially in brainstorming tasks, the quality of thinking depends a lot on the language that is used. It is difficult to share ideas without a good use of language. Previous research in social psychology has shown that in brainstorming tasks, our general thinking abilities get hampered when in a social environment. Is this because the social environment directly affects our thinking skills? Or is this because the social environment acts on our language skills, that then influence our thinking abilities? Clark believes that language is fundamentally used for social purposes. If language is a social process, social influences should have less impact on it, as we are all used to using language in group settings.

The results here support the claim that language is a social process. There was little effect of group dynamics on the lexical brainstorming task. The way that people used language and the order that people retrieved words was similar in both the case of working alone and working in a group. If these results are to be believed, then the previously found effects of groups on brainstorming may need to be narrowed to certain type of tasks, such as non-language related tasks.

References

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