
# LANGUAGE UNDER ALTERED STATES OF CONSCIOUSNESS

## PSYCHEDELIC DRUGS

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## 1 INTRODUCTION

Benjamin Lee Whorf, an American linguist famous for proposing the 'Sapir-Whorf hypothesis', was quoted claiming that 'language shapes the way we think, and determines what we think about' (Whorf, 1956). The monumental hypothesis puts forward a claim that language has a significant impact on the nature of the human thinking process, and therefore the nature of the mind itself. This idea has been a point of debate between philosophers, linguists, neuroscientists and more recently, computer modelers. Finding itself at interdisciplinary crossroads of many such disciplines, uncovering the way that language shapes the human experience has become a fundamental question (Boroditsky, 2011). The proposal, referred to as *linguistic relativity*, has not had much empirical success in the past. However recent advancements in neuroimaging techniques could help uncover some of the enigma (Zlatev & Blomberg, 2015). The following text will aim to review the relevant literature surrounding the domain of language. Section one will establish the grounds upon which research of language lies, focusing on its evolution, linguistic relativity and language processing areas in the brain. The second section will introduce research highlighting the current understanding of language from the altered states of consciousness point of view. In particular, implications of a recent paper by Carhart-Harris et al. (2016) will be discussed. The aforementioned research dealt with uncovering the neural correlates of the LSD experience. It proposed the use of modern neuroimaging techniques and potential for therapeutic benefits stemming from a breakdown of neural activity patterns associated with particular disorders (Carhart-Harris et al., 2016). It is hoped that interdisciplinary research projects from the field of cognitive science will further fuel the understanding of the intrinsically 'languaging' beings like us (Zlatev et al., 2015).

## 2 LANGUAGE

Despite the prevalence, and dominance thereof, of language as a communication tool between humans - there still exist numerous questions regarding the ways in which language evolved (Bickerton, 2007). While many animals exhibit expressive intents, these intents always have to be grounded in a particular environment in order to evoke what constitutes communication. This in turn is not true of language. A particular novelty of language is its evolution of words (symbolic units) and syntax (organization of the symbolic units) (Bickerton, 2007). Bickerton (2007), in his seminal tour of language evolution, outlines prominent features of human language to be studied. These 'protolanguages' from which language as we know it evolved today exhibited features unlike animal sounds. Stemming from the previously mentioned emergence of words and syntax, the human communicators were at some particular point in time able to adopt a greater amount of words, more complex sentence structure and abstract thought about something not directly present in perception (Bickerton, 2007). During its evolution, language also took on a cultural basis. While it is not clear whether language began in one or numerous places, and the exact time frame that it took to shape, it is clear that this symbolic system of communication shares a narrow pattern between different cultures (Zlatev et al., 2015).

While every text on language should clearly consider the implications mentioned above (see Bickerton, 2007), what is also of particular interest and importance are the questions regarding the ways that language interacts with human thought. Zlatev et al. (2015) outlines four important considerations in addressing the *linguistic relativity* hypothesis. First, the concept of language and thought is often considered to be the same in terms of *linguistic relativity*, as the subjective mind perceives and expresses itself through the use of language. But Zlatev et al. (2015) proposes that it is possible to disentangle the two by regarding language as a useful means to think with, separating thought into a higher cognitive process which encompasses other processes of conscious awareness like mental imagery. While there are many processes which are directly linked with language such as planning, internal speech and the concept of the ego - language is capable of influencing, but does not limit all manifestations of cognition. It is therefore accepted that the mind contains a sort of pre-symbolic mode of representation, such as in research of motion event typology (Talmy, 2000), grounding the separate concepts of language and thought (Zlatev et al., 2015). Second prerequisite is the necessity of situating language in a particular cultural discourse, as the symbols and syntax themselves would not explain much of the meaning behind the used language. People which

employ distinctly different uses of language from English speakers display an evident difference in their thought process. One of the vastly studied examples of such people are the Pormpuraaw. Pormpuraaw use absolute cardinal directions in their speech and consequently are extremely accurate when situating themselves even in unfamiliar places (Boroditsky, 2011). The cultural factors shaping the language should therefore be studied alongside the structure of that particular language - encompassing the entirety of expression. Stemming from the discussion of cultural impacts on language, the expressions also contain a particular informative quality embedded in the structure that it resides in. In order to convey particular information, the language has to be structured, and this structure contains information in itself (Zlatev et al., 2015). Lastly, theories of linguistic influence can be thought of as pertaining to either specific or general kinds of language and context. In brief, this means that different theories express different paradigms. For example, the 'Sapir - Whorf hypothesis' is concerned with a specific mechanism of language which influences many aspects of thought. Other theories fall into the categories which would see the influence of language as specific on specific thoughts like internal speech, general language influence essentially creating thought and conveying language as a useful mechanism in assimilating thought (Zlatev et al., 2015).

With some of the fundamental considerations regarding the evolution of language and theories of linguistic influence, it is important to briefly discuss the areas of the brain responsible for language related functions (Binder et al., 1997). Research into brain areas with specific functions is often conducted using a fMRI while providing subjects with a linguistic and a non-linguistic task, separately (Binder et al., 1997). The analysis then compares the neural activations between both of the tasks. While many of the studies have not found localized brain areas, results often agree with the classical view (Ardila et al., 2015). In short, two areas are found. The first area's function is reception and understanding of language (Wernicke's area), while the second is activated during language expression tasks (Broca's complex) (Binder et al., 1997; Ardila et al., 2015). These two areas encompass but also extend to left temporoparietal and frontal areas of the cortex (Binder et al., 1997).

## 3 IMPACT OF PSYCHEDELIC DRUG RESEARCH

Lysergic acid diethylamide (LSD) is a psychedelic drug which alters consciousness in a profound way (Family et al., 2016; Krippner, 1970). The discovery of the drug's effects has inspired a plethora of recent research into the occurring neural patterns in the human brain. This report will specifically focus on the implications of a paper by Carhart-Harris et al.

(2016), providing evidence by discussing related research on effects of LSD on numerous features of natural language. The first finding of the paper identified brain areas responsible for visual processing. An increase in neural activity in the visual cortex positively correlated with subjective reports of complex imagery and simple visual hallucinations (Carhart-Harris et al., 2016). In general, participants in such studies often lack the means of describing such experiences. Reporting that the patterns are impossible to describe using natural language, possess impossible properties or attain a new, profound meaning - it is evident that the altered perception of the world influences the patterns of speech (Sanz et al., 2021; Wießner et al., 2023). These observations highlight a feature of *linguistic relativity*, in which the relationship between language and cognition is not purely one directional. Visual hallucinations could be used to explore the possibility of the relationship being bidirectional. The cognitive aspects of the mind, such as the previously stated mental imagery and immediate visual perception, might deeply influence the language we ascribe to the experience. In the case of a wakeful state of consciousness a participant is able to more accurately describe the patterns of thought. However, the states of consciousness elicited by psychedelic drugs display patterns which are more chaotic, less interpretable and disorganized. A study conducted by Sanz et al., (2021) observed similar effects to the ones described above by analyzing organization of utterances and their semantic meanings. Researchers observed that the participants utilized more words than needed when reporting on the experience, while the diversity of the used words decreased (Sanz et al., 2021). It is likely that during the altered state of consciousness, the areas in the brain responsible for production of language are in a way 'flooded' by what is experienced in perception. Thus while reporting on the experience there seems a lot to describe without proper words for of describing it. While it is difficult to empirically test hypotheses of such nature, being able to observe interactions between visual perception and language could fortify the bidirectional influence between language and cognition. Sanz et al., (2015) similarly proposed this parallel as evidence that the language mirrors thoughts. Additional evidence can also be observed in a study by Family et al., (2016) in which participants were presented with a picture naming task. The obtained results described the disorganization of the mind being consistent with an increase in meaning of the presented pictures (Family et al., 2016). The analyzed study further contributed to the study of language through employing subjective reporting as their main methodology. Tagliazucchi (2022) conveyed this necessity for exploring ways of approaching research on psychedelic drugs. In the proposed methodology, the phenomena can be studied along the dimensions of a) freedom while reporting and b)

the level of subjectivity (Tagliazucchi, 2022). The results obtained from ascribing cognitive phenomena with active brain areas validate the use of a subjective report through use of a constrained questionnaire or an unconstrained spoken report. Possessing a method for studying the effects of psychedelic drugs on vision and language gives opportunity for expanding the research further to other domains. Further implications on the domain of language stem from identifying the effects of the drug on various resting state networks, brain areas responsible for critical functions of human experience such as daydreaming, deep sleep, perception, sense of self , among many others (Carhart-Harris et al., 2016). The paper reported a sort of 'rewiring' occurring inside the networks, effectively changing the interplay between neural activations within the network. While the activity within the network was observed to be less integrated, the signals between the major networks displayed desegregation (Carhart-Harris et al., 2016). These findings align with reports of discontinuity of deep thinking patterns (Wießner et al., 2021). Such findings further indicate a decrease in structure within networks directly responsible such observed functions. One of such networks that can be affected by the drug could be the aforementioned Wernicke's area and the Broca's complex, along with other areas involved in language functions. This finding could further be extended into often reported coloring of cognitive processes such as emotions. The networks being able to forge new synaptic connections evoking previously thought of as difficult to describe perceptive phenomena. This in turn further ties into the potential for therapeutic benefits, as the changes in language structures provide new patterns of thinking. These novel patterns are discussed in the majority of publications discussing the effects of psychedelic drugs as breaking down neural patterns upon which disorders may lie (Wießner et al., 2021; Tagliazucchi, 2022; Carhart-Harris et al., 2016). The ability to further define the possible mechanisms which underpin the therapeutic benefits is a beneficial step in significantly improving the lives of people suffering from depression and emotional instability among others.

Ultimately research continues to highlight the necessity of interdisciplinary methods practices and the incorporation of important findings when attempting to shine light on complex human phenomena.

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