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LANGUAGE AND VISUAL IMPAIRMENT: LITERATURE REVIEW

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Abstract

This article is a review of the literature on the effects of visual impairment on language. The article begins with an overview of the role of vision in language development from a philosophical point of view, followed by a psychological approach. The aim is to show that psychology has not provided a clear answer to the question of the relationship between visual impairment and language development in children.

An inventory of specific linguistic features among blind children is done through a comparison with the language of blind adults. This inventory allows us to show that the specific features in children are not real problems but rather a mode of development specific to blind children.

Keywords: Cognition, Language, Mental Representations, Visual Impairment, Vision

Langage et déficience visuelle : une revue de littérature

Résumé

Cet article est une revue de la littérature sur les effets de la déficience visuelle sur le langage. L'article commence par un aperçu du rôle de la vision dans le développement du langage à partir d'un point de vue philosophique, suivie par une approche psychologique. L'objectif est de montrer que la psychologie n'a pas fourni une réponse claire à la question de la relation entre la déficience visuelle et le développement du langage chez les enfants.

Un inventaire des particularités linguistiques chez les enfants aveugles se fait par le lien avec le langage des adultes aveugles. Cet inventaire nous permet de montrer que les caractéristiques des enfants ne sont pas de vrais problèmes, mais plutôt un mode de développement propre aux enfants aveugles.

Mots-clés : Cognition, Handicap visuel, Langage, Représentations mentales, Vision

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Lenguaje y discapacidad visual: Una revisión de la literatura

Resumen

Este artículo es una revisión de la literatura sobre los efectos de la deficiencia visual en el lenguaje. El artículo comienza con una descripción de la función de la visión en el desarrollo del lenguaje desde un punto de vista filosófico, seguido de un enfoque psicológico. El objetivo es mostrar que la psicología no ha dado una respuesta clara a la cuestión de la relación entre el deterioro visual y el desarrollo del lenguaje en los niños.

Un inventario de las especificidades lingüísticas de los niños ciegos se realiza mediante la vinculación con el lenguaje de los adultos ciegos. Este inventario nos permite mostrar que las características de los niños no son problemas reales, sino más bien un modo de desarrollo para los niños ciegos.

Palabras clave: Cognición, Lenguaje, Representaciones mentales, Discapacidad visual, Visión

Introduction

Research into the effects of visual impairment on language has mainly focused on children. Many studies have particularly investigated language acquisition in blind children. (i.e. Anderson, Dunlea & Kekelis, 1984; Dunlea, 1989; Erin, 1986; Landau & Gleitman, 1985; Gleitman 1990; McGinnis, 1981; Perez-Pereira & Castro, 1997; Urwin, 1984). The results obtained in such studies have often differed, for two main reasons. First and foremost, due to methodological problems, especially the difficulty to obtain a sufficiently large sample size (research was often based on a single case study or a group of two or three children) and a sufficiently homogenous sample (researchers often failed to take into account the varying degrees of visual impairment of the participants). Furthermore, another explanation for such discrepancies in previous results may be the importance ascribed to language by the authors. The present article aims to illustrate the role of language in the intellectual development of blind people, and the effects of visual impairment on the nature of language.

A Philosophical View

The discovery of mirror neurons (from studies on monkeys) implies that vision plays an important part in our comprehension of the world around us. The mirror neurons fire both when the subjects perform certain tasks and when the subjects observe the same specific task performed by someone else. Such neurons are activated not only when a monkey engages in an action but also when it observes an action. Hence, mirror neurons appear to be extremely important in understanding the actions of others, but also the process of imitation. More generally speaking, some authors have hypothesised that these neurons may be the basis of our communication systems. When observing mirror neurons activation in "Broca's area", Rizzolatti and Arbib (1998), suggested that the system of mirror neurons is the basis of language evolution. This idea is emphasized throughout their article to show that vision plays an essential role in the intellectual development of sighted persons. We shall see that vision has been considered, and still is by many researchers (see Galliano & Portalier, 2009; Pérez-Pereira & Conti-Ramsden, 1999), as the main source of learning. However, experience has

shown that vision is not always essential as can be easily illustrated through the example of blindness. This is not a new field of thought, and the link between knowledge and vision was formulated by philosophers many centuries ago. The question has been examined from two viewpoints: those who advocate interdependence between vision and cognition and those who deny it.

Over the last three centuries, philosophers declared that knowledge derives from experience. This thesis was supported by Bertrand Russell (1912) who argued that there is a kind of knowledge that cannot be coded into language. This knowledge is sensory and “direct” (knowledge by acquaintance), connected to the sensory system, and is the basis of the construction of a physical world. With this theory, a blind person, deprived of this important component of experience (vision), apprehends the world in a different way from those who have no visual impairment. Consequently, the conceptual system may be considered defective (Galiano & Portalier, 2009).

The antithesis is supported by the philosopher Bryan Magee (1995), amongst others, in an epistolary dialogue with the blind philosopher Martin Milligan. This thesis goes against the first and earlier theory, because it considers language as a mediator in the development of conceptual knowledge. This implies a “knowledge by description” which is constructed through language. Language thus seems to have a compensation function in the development of the conceptual system of blind people. Therefore, the conceptual system of such individuals is no different from that of sighted people.

This bipolar approach of the debate about construction of conceptual knowledge and the role played by language in this construction is also present in psychology (Galiano & Portalier, 2009).

A Psychological View

The debate on the role of perception and language in the development of the conceptual system of visually impaired people is especially interesting in cognitive psychology, since such a question relates to sensory impairment. Just as in philosophy, two conflicting theories exist in psychology: a theory of the primacy of perceptive experience over the linguistic one, and inversely, a theory that advocates the primacy of language over vision.

Psychologists have repeatedly studied the role of language in the cognitive development of non-impaired individuals. In his first publications, Piaget (1964) suggested that language plays a secondary role in the development of knowledge (thought precedes language), whereas Vygotsky (1985) advocates that language has a crucial place in cognitive development (language is seen as a tool for planning and controlling mental activity). Concerning blind people, two schools of thought have also developed around the specific issue of sensory impairment (Galiano & Portalier, 2009).

Dunlea’s (1989) perspective concurs with Russell’s of the supremacy of direct experience (knowledge by acquaintance). According to her theory, although blind people use the same words as sighted individuals, the exact significance given to these words does not consistently coincide with that of the sighted population. She explains this fact by the importance of perception in the formulation of concepts; the significance is directly linked to the conceptual schemas of the speaker. Therefore, a visual impairment leads to an altered understanding of any given word (resulting from a lack of relation between ‘signified’ and ‘signifier’).

In opposition to this thesis is the idea of the primacy of linguistic experience over the perceptive experience. The latter theory does not deny the existence of a link between language and visual perception, but it does cast doubt upon the direct correspondence between cognition (or even knowledge) and language (Pérez-Péreira & Conti-Ramsden, 1999). Language is seen as a tool for understanding the world around us (knowledge by description). To do that, blind people have increased attention to the spoken word in order to obtain information within the structure of the sentence which they cannot gain directly due to their impairment. This theory is supported by Landau and Gleitman (1985) and Gleitman (1990) with the *syntactic bootstrapping hypothesis* concerning sighted children. This hypothesis postulates that children are able to utilize their knowledge of the syntactic structure of a sentence to access the meaning of words. Hence, blind children speak the same language as visually able individuals, because the information needed for grasping meaning does not use the visual system (Landau & Gleitman, 1985). However, the authors do specify that for colour perception, blind children and sighted children do not fully share the same signification. Although blind people do use colour names, the signification attributed to these names only coincides partially with those of the visually abled. The language of blind people specifically regarding colours is considered to be consensual in that they are able to use learned information about colours — for instance, when one asks blind people what colour grass is, they will answer “green” as they have been taught. However, the case of colour naming is an exception and generally the syntactic context does provide blind people with the necessary information for the comprehension of words referring to colours (Landau & Gleitman, 1985). Therefore it seems that, depending on the stance taken on this issue, authors give a negative or positive answer to the question of the importance of a sound visual system for the construction of conceptual knowledge. Concerning the system of conceptual development in blind people, researchers continue to diverge as to the similarity between the conceptual system of the blind and that of the sighted population.

Language Development in Blind Children

Research in neuroscience has shown that verbal and tactile stimuli play a significant role in the compensation system of congenitally blind people (Burton, Snyder, Diamond & Raichle, 2002; Roder, Stock, Bien, Neville & Rosler, 2002; Sadato, Pascual-Leone, Grafman, Ibanez, Deiber, Dold & Hallett, 1996; Sadato, Pascual-Leone, Grafman, Deiber, Ibanez & Hallett, 1998; Portalier, 2002). Language is an important source of information for the development of conceptual and analogical systems for the blind people. Previous studies about the development of language in blind children have provided a wealth of information. This focus on the language skills of blind children enables us to generate a clear picture of the effects of visual impairment on language development.

Several studies between the 1960s and the 1990s specifically explored the use of an egocentric style of language in blind children (Anderson, Dunlea & Kekelis, 1984; Urwin, 1984). An observation of their first hundred words suggests that blind children’s speech is exclusively self-centred and largely composed of words describing the child’s own actions. The language employed by these children does not therefore take external elements into account. Furthermore, during a conversation, blind children have a tendency to change or switch subjects (Andersen, Dunlea & Kekelis, 1984). A study of the effects of visual impairment on family discussions focused on four mothers in interaction with their blind or visually impaired child aged 27-36 months over a six-month period. The results showed that the average length of speaking turns of the visually impaired children was similar to their

mothers', while the average length of speaking turns of the blind children was considerably shorter than their mothers' (Kekelis & Prinz, 1996).

A number of studies have aimed to illustrate one particular linguistic trait observed in blind children. These studies have focused on the developmental period before the emergence of symbolic play, and sought to provide evidence of a specific language delay in the use of personal pronouns, and pronoun reversal problems (Fraiberg, 1968; Fraiberg & Adelson, 1975; Dunlea, 1989). Fraiberg, Smith and Adelson (1969) found that whilst blind children developed the "*syncretic I*" around the same age as their sighted peers (around the age of 2.4 years), the "*non-syncretic I*" appeared later, at around 4-5 years of age. For these experimenters, this difficulty in blind children is linked to the development of deixis, the exploitation of contextual information, in order to establish details about the individual's present, time and place. Developmental delays observed in the acquisition of the Theory of Mind in blind children could also be correlated with this difference in the acquisition of the pronoun "I", as well as the concept of "Me, not-Me" associated with the development of individual identity, from a very young age. A "theory of mind" is a specific cognitive ability to understand others as intentional agents and to infer the beliefs, intentions, knowledge and desires of others (Baron-Cohen, 1991).

Pérez-Pereira and Conti-Ramsden (1999) suggested that this tendency towards pronoun reversal (Dunlea, 1989; Fraiberg 1968; Fraiberg & Adelson, 1975) could not be said to be a specific trait of blind children, as only a small percentage of blind children regularly make this mistake.

Dunlea (1989) showed that some visually impaired children, at around 30 months of age, tend to speak in the past tense. From a more pragmatic viewpoint, concerning blind children's use of language in context, Dunlea's (1989) longitudinal study of 6 children (two blind, two visually impaired and two sighted), revealed that in blind children's speech, the production of statements to capture the attention of the other person emerges before or at the same time as affirmative statements. This tendency was not observed in the two sighted children. For Dunlea, this difference is due to the fact that sighted children already have visual cues and therefore less need to attract the other person's attention verbally. Another of Dunlea's findings is that unlike sighted children, blind children are not found to vocalise statements of offering and showing something. Similar results were observed in two other studies (McGinnis, 1981; Erin, 1986) highlighting an increase in the amount of questions blind children ask. Erin (1986) for example, using a similar methodology with three groups of children aged between four and ten, found that although all three groups showed a high incidence of requests, (words beginning in "Wh") the percentage was slightly higher in blind or visually impaired children. According to him, this is due to the fact that "Wh-" questions are essential and are the only way for the blind children to discover their surroundings.

Anderson & Ficher (1986) carried out a study of 10 congenitally blind children and 10 children with no visual disability, all aged three to four. The study focused on nominal realism, the tendency to consider the name given to an object and the object itself as one and the same. They observed that nominal realism as well as animism persist much longer in blind children than in sighted children. As for spoken language, which is an indication of a good understanding, McConachie (1990) observed a delay in blind children due to a delay in acquisition of the first words around the age of two. A 1992 longitudinal study by Pérez-Pereira and Castro, followed two dizygotic twin Hispanic girls, one blind and one sighted, between the ages of 2.5 and 3.5. This study illustrates the differences in the use of pragmatic

categories. Specifically, the blind child tended to use more self-centred language with very little use of language directed toward others. Furthermore, she uttered significantly more statements describing actions or her intention to carry out actions or wishes. Results also showed that the blind sister often used language imitation, routine and repetition (IRR speech). These findings were complemented by a subsequent publication concerning the same two children (Perez-Pereira and Castro, 1997) (a blind child and her sighted twin sister), this time up until the age of 5.4 years. The findings of this second study confirmed the importance of imitation, routine and repetition in the blind child. The authors state that children appear to use a "*Gestalt style of language learning*", as a mechanism for language analysis, a particularly valuable technique for blind children.

Some authors have defined the linguistic performance of blind people as incongruous due to a lack of visual cues. It is helpful to review the debate of the use of colour words. The concept of verbalism was first introduced by Cutsforth in 1932 (in Hatwell, 2003; Pérez-Pereira & Conti-Ramsden, 1999) to describe words or expressions used by blind people without reference to a concrete sensory experience. Blind people can thus employ the words of the sighted people to describe objects that they have not been able to experience directly due to their visual impairment. Verbalism has since been separated into visually oriented verbalism, for words arising from a visual experience, and global verbalism covering those words that are not associated with a sensory experience (Harley, 1963). Harley (1963) compared 40 children aged between 6.11 and 14.3 on a verbalism scale (word definition). The results of this study indicated that verbalism decreases with age. Demott's (1972) study of 41 blind people, 41 visually impaired individuals and 61 sighted participants aged between 6 and 19 years, was also based on a verbalism scale. His results suggest that there is no significant difference between groups. The sighted individuals generally gave the same meaning to concepts, just as the blind and visually impaired people did.

However, several studies (Anderson & Olson, 1981; Millar, 1983; Nelson, 1985; Nolan, 1960) raised doubts on the existence of such a specific language trait in the blind, as even sighted people make use of words of which they have no direct concrete experience. In 2005, Rosel, Caballer, Jara and Oliver published a study to investigate the use of such verbalism in 62 congenitally blind children and 64 visually impaired children aged between 7 and 14. They found that neither the degree of visual impairment nor the child's gender had any impact on the frequency of verbalism use in the children. Age, on the other hand, was found to have a significant impact. Such results suggest that language is a flexible structure correctly employed by congenitally blind children; the latter have the ability to adapt adequately to the language used by those around them.

Many studies on language acquisition by blind children (see Dunlea, 1989; Fraiberg & Adelson, 1975) highlight delays rather than true disorders. According to these authors, although the visually impaired children do not necessarily develop linguistic abilities at the same rate as the sighted children, they acquire them eventually. Other authors (Pérez-Pereira & Castro, 1997; Pérez-Pereira & Conti-Ramsden, 1999) support the idea of specific linguistic traits in the blind. They insist on the importance of taking into account the linguistic differences observed as evidence of an alternative and specific pattern of development rather than a deficit.

Language Use in Blind Adults

The issue of language use in blind adults has seemingly attracted little research interest. Studies in this area are scarce and far between and are mainly carried out in social

psychology, most notably the work of Rutter, Stephenson and Dewey (1981), Kemp (1981), Rutter (1984), and Kemp and Rutter (1986). Furthermore, these studies do not aim to understand the specific nature of language in blind people, but rather study the role of vision in communication. The use of a group of blind participants enables the authors to understand the role played by vision in conversational interactions as well as observe the behaviour of blind people in social interactions. These authors have suggested the concept of *cuelessness* in reference to the ensemble of multisensory non-verbal cues available and exploitable by the speakers in the conversation (Rutter, Stephenson and Dewey, 1981; Rutter, 1984). Therefore, it is possible to rate social interactions on an ordinal scale, based upon the quantity of multisensory non-verbal cues available to each speaker.

In 1981 Rutter, Stephenson and Dewey used two experimental conditions: a face-to-face interaction versus a telephone interaction. The second situation introduces the variable of the absence of reciprocal visibility that can be linked to blindness. The authors analysed some thirty variables, and the results showed very few differences between the two situations.

Another study published by Kemp and Rutter (1986) (in Kemp 1981; Rutter, 1984) included blind people using three experimental conditions in the following way: dyadic interaction between two blind people, between one blind people and one sighted person, and finally, between two sighted people. The three situations were used to observe the effect of non-verbal cues on speech production. The condition in which two blind individuals interact contains the least non-verbal cues to support the communication. Conversely, the interaction between the two sighted participants involved the most non-verbal cues, the blind-sighted interaction being halfway between the two.

The results of this study show that the statements spoken by the blind group are less instrumental and more personalised when compared to the sighted dyads. In regard to language style, blind people were more spontaneous and hence less structured than the sighted people. Significant differences were observed in the following variables: 'offering and accepting information', 'procedure and irrelevant information', 'duration of simultaneous speech (seconds)' and 'number of utterances (words)'. On average, the experimental group of blind-blind dyads obtained higher rates on most of these variables. However, the variable 'offering information' was found to be inferior in this group compared to the other two groups. Results also showed that, statistically, the group of blind-sighted dyads was halfway between the other groups. Contrary to expectations, the blind-blind group actually showed very small differences compared to the other groups (blind-sighted and sighted-sighted) in their speech behaviours.

In 1998 MacCluskie, Tunick, Dial & Paul studied the role of vision in the development of abstraction, the ability to formulate categories and concepts and express them through language. They particularly looked at differences in verbal and non-verbal communication in the abstractive ability of adults who were blind from an early age (before the age of two) compared to those who lost their sight after the age of five, when their expressive language skills were more developed. No significant differences were observed between the two groups, with regard to these elements assessed using the Cognitive Test for the Blind (CTB) and the Verbal subscale of the Wechsler Adult Intelligence Scale-Revised (WAIS-R). Furthermore, researchers observed that the level of education affected the variability of scores in WAIS-R tests.

Discussion

As we have observed in this article, researchers do not agree on the nature of the effects of visual impairment on language, and on the part played by language in the construction of meaning. However, we can assert that visual impairment does not necessarily involve specific language disorders. Surveys we have listed are few but reveal that visual impairment involves difficulty in acquiring language elements, rather than true language disorders. Moreover, difficulties arising during childhood often either subside or even totally disappear in adulthood. Nevertheless, those surveys also have their limitations. First, their sample sizes are too small (only a few subjects per study), and they should rather be considered as case studies.

Their results cannot be generalised and applied to all blind people. Secondly, the comparison parameter used in these surveys is a population of sighted people. Even though this choice enables the differences between both populations to be highlighted and the deficits to be recorded for example, these surveys do not indicate what level of language any specific blind subject has reached within the visually impaired population. What we need indeed is an explanatory model of the typical language development in blind subjects, which we could refer to when making a diagnosis. The necessity for carrying out research in this field seems obvious. More specifically, we suggest that research should address two specific language aspects.

First, we know that blindness involves difficulties of spatial representation (see Hatwel, 2006). It would be relevant to check if this characteristic exists in the acquisition of spatial language. In 2009, the INS HEA in Suresne (France), under the supervision of the linguist N. Lewi-Dumont, initiated a research project on spatial language acquisition at school, from kindergarten to elementary school. The first results are expected at the end of 2011. We think that this type of research should be extended to other linguistic areas in order to study the influence of a linguistic complexity factor.

The second field of research is pragmatism – that is the use of contextual language –, which represents the third dimension of language, after meaning and syntax.

Most studies on language focus on these two latter dimensions. Very few studies (Dunlea, 1989; Pérez-Péreira & Castro, 1992) address the pragmatic dimension of language. Studies should focus more specifically on the referential function of language (Galiano & Portalier, 2009), that is to say the way a blind person describes sensible things. Developing research on the referential function of language would lead to an improvement in audio description technology (narrative description of films, documentaries, plays, etc, for blind and visually impaired audiences). In fact, such a technology is based essentially on a few ministry recommendations and the empirical practice of translators (Galiano & Portalier, 2010).

Finally, initiating research in these two areas would help increase our knowledge of language development specific to blind people and thus improve their everyday life.

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