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Review Article

Cognitive Communication Disorder: A Proposal for Clinical Classification

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ABSTRACT

Cognitive Communication Disorders (CCD) represent an area of speech-language therapy that consistently poses challenges to the discipline. This is partly due to the heterogeneous nature of the clinical picture of CCD, but also to how relatively recent the approach to this disorder is. Due to this, there is a need for subclassifications that account for the distinctive characteristics of the different profiles of this disorder. The aim of this study was to determine the feasibility of establishing a clinical characterization that enables the sub-classification of CCD. To achieve this, a systematic review was carried out, analyzing articles that address the topic. The search was performed using the PubMed and Web of Science (WoS) databases, including the terms Cognitive-Communication Disorder OR Cognitive-Communication Impairment. The cognitive-communicative characteristics identified in each of the articles were analyzed by category, enabling potential groupings that are based on the degree of convergence between the findings and macro-categories to which they can be subsumed. The results show that there are three profiles associated with this disorder: one linked to difficulties in basic cognitive skills, another that presents difficulties in pragmatic communicative skills, and a third that exhibits difficulties in both areas. It is concluded that the subclassification of CCD is viable given the evident convergence of difficulties, and it can be sub-categorized into Executive CCD (eCCD), Pragmatic CCD (pCCD), and Executive-Pragmatic CCD (epCCD).

Keywords:
Cognition; Communication; Executive Function; Brain injuries; Neuropsychology; Communication Disorder

Trastorno Cognitivo Comunicativo: propuesta de una clasificación clínica

RESUMEN

Una de las áreas de acción que constantemente está presentando nuevos retos en fonoaudiología es el Trastorno Cognitivo Comunicativo (TCC). Esto se debe, en parte, a la heterogeneidad del cuadro clínico. Debido a dicha heterogeneidad, surge la necesidad de contar con subclasificaciones que den cuenta de las características distintivas de los distintos perfiles que pueden ser observados en este trastorno. Dado lo anterior, el objetivo de este trabajo fue determinar si era posible agrupar las características observadas en el TCC para crear subclasificaciones. Para ello se realizó una revisión sistemática de artículos que abordan la temática. Para efectuar la búsqueda se consultaron las bases de datos "PubMed" y "Web of Science" (WoS) incluyendo los términos (cognitive-communication disorder OR cognitive-communication impairment). Las características cognitivo-comunicativas identificadas en cada uno de los artículos se analizaron de modo categorial, permitiendo generar potenciales agrupaciones de acuerdo con el grado de convergencia que presenten los hallazgos con macro categorías a las cuales puedan subsumirse. Los resultados muestran que existen tres perfiles asociados a este trastorno, uno asociado a dificultades en las habilidades cognitivas basales, otro a dificultades en las habilidades comunicativas pragmáticas y un tercero que presenta dificultades en ambas áreas. Se concluye que la subclasificación de TCC es viable dada la convergencia de las dificultades evidenciada. Éste se puede clasificar en TCC Ejecutivo (TCCe), TCC Pragmático (TCCp) y TCC Ejecutivo-Pragmático (TCCep).

Palabras clave:
Cognición; Comunicación; Funciones Ejecutivas; Lesiones Cerebrales; Neuropsicología; Trastornos Comunicativos

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INTRODUCTION

One area of speech-language therapy –and neuropsychology in general–that frequently poses new challenges is Cognitive Communication Disorder [CCD] (Turkstra et al., 2005). This is due partly to its prevalence, with CCD secondary to vascular injury having an estimated prevalence between 39% and 49% after the first stroke (Hinckley, 2014), and between 80% and 100% after traumatic brain injury (Copley et al., 2015). Additionally, CCD is the most persistent consequence found in people with neurocognitive conditions, directly impacting work reintegration and socialization (Steel et al., 2013). On the other hand, CCD has a highly heterogeneous clinical presentation, including a high incidence of neurological disturbances that affect cognition and therefore communication. This makes it necessary to reconceptualize CCD.

The most used definition of this disorder is currently the one established by ASHA in their proposal for the role of therapy in CCD, published in 2005 (MacDonald & Wiseman-Hakes, 2010). This definition has been replicated up to the present despite no longer being available on the official website of the association. It states that "Cognitive-communication disorders encompass difficulties with any aspect of communication that is affected by disruption of cognition. Communication may be verbal or non-verbal. This includes listening, speaking, gesturing, reading, and writing in all domains of language (phonological, morphological, syntactic, semantic, and pragmatic). Cognition includes cognitive processes and systems (e.g., attention, perception, memory, organization, executive function). When there is a cognitive impairment, not only is communication affected, but various functions are also impacted, including behavioral self-regulation, social interaction, activities of daily living, learning and academic performance, and vocational performance. Regarding etiology, it is recognized that cognitive-communication disorders can have congenital or acquired origins. Congenital etiologies include, among others, genetic disorders and prenatal, perinatal, and postnatal neurological injuries and diseases. Acquired etiologies include, among others, stroke, brain tumor, traumatic brain injury, anoxic or toxic encephalopathy, and non-degenerative and degenerative neurological diseases (including dementias)" (ASHA, cited in Kreutzer et al., 2018).

As can be observed, the definition of cognitive-communication disorders (CCD) addresses not only their neuropsychological but also their etiological characteristics, processes, and cognitive systems (Kreutzer et al., 2018), which undoubtedly complicates the characterization of the condition (Drummond & Boss, 2004; MacDonald & Wiseman-Hakes, 2010). This can be explained by how this definition emerged, which initially aimed to differentiate primary cognitive disorders, or CCD, from primary language disorders, such as aphasia, following a stroke (Togher et al., 2014). This idea aligns with Behn et al. (2019), who propose that CCD can be associated with primary non-linguistic difficulties such as working memory, attention, and executive functions, which in turn impact linguistic performance.

Unlike aphasia, which has traditionally been characterized according to injury location (Javed et al., 2024; Nasios et al., 2019; Stinnett et al., 2024), CCD implies greater complexity because any condition of the central nervous system that involves cognitive processing affects communication, regardless of its etiology (Ambiado-Lillo, 2019). The difficulty in determining the neurophysiological bases of CCD, along with the relatively recent recognition of cognitive-communication disorders as a clinical condition–meaning it has been studied for a shorter period compared to aphasia– explains why despite its prevalence, the study of aphasia is significantly more extensive (Lindsey et al., 2023).

Given the breadth and heterogeneity of this disorder, the need arises to refine the definition of cognitive-communication disorders (CCD) to more precisely understand its characteristics. This would allow for better diagnostic and therapeutic processes. One way to more specifically determine the characteristics of this disorder is by incorporating sub-categories that can capture the various profiles found within the CCD spectrum.

Considering the above and the clinical variability of this nosological entity, the question of this research is: can a clinical characterization of CCD be established that allows for its sub-classification? To directly address this question, the objective established for this study is to identify the various clinical characteristics of CCD present in the literature, with the aim of proposing possible sub-groups that reflect the distinctive features found in people with CCD.

METHODOLOGY

A systematic review was carried out on articles addressing the clinical characteristics of CCD. The methodology outlined by Cermak et al. (2019), structured into five steps, was used as follows: (1) identifying the research question; (2) identifying relevant studies; (3) selecting studies for detailed analysis using inclusion/exclusion criteria; (4) grouping data according to key concepts; and (5) compiling and summarizing the findings of the selected studies.

The search was conducted in November 2022 through the databases PubMed and Web of Science (WOS), with the search terms (Cognitive-Communication Disorder) OR (Cognitive-Communication Impairment), without restrictions on the year of publication. Both search terms included a hyphen to respect the classical proposal by ASHA.

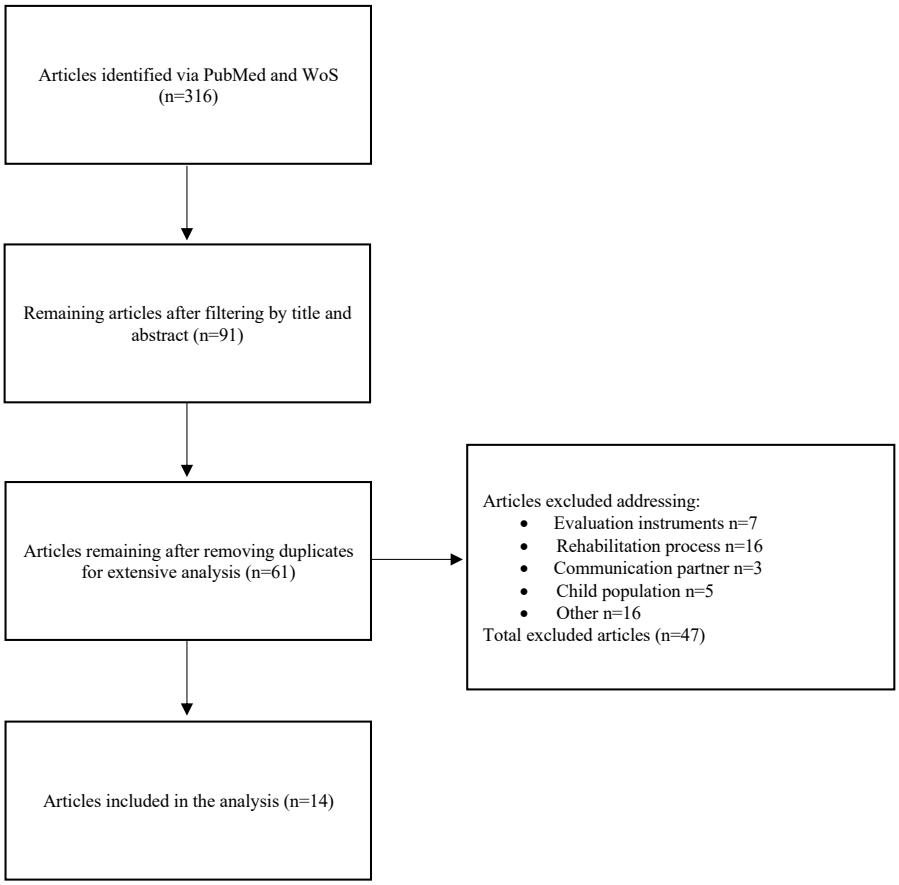

Figure 1. PRISMA flow diagram for the article selection process.

The inclusion criteria were: articles focused on the adult population that included clinical characteristics of CCD. Exclusion criteria included book reviews, articles focused on the characteristics of family members or communication partners, articles focused on the development of assessment instruments, and studies focused on rehabilitation proposals.

The data were grouped into an extraction table (see Table 1) for processing. This table included year of publication, country of origin, type of study, etiology of the cognitive-communication disorder, and cognitive-communication clinical characteristics described.

Finally, despite the heterogeneity of the objectives found in the included studies, the communication characteristics identified in each article were analyzed categorically, which made it possible to generate groups according to the degree of convergence between the findings and macro categories to which they were subsumed.

RESULTS

A total of 316 articles were obtained. Duplicates were removed, and titles and abstracts were analyzed. Only articles explicitly addressing the concepts "cognitive-communication disorder" and "cognitive-communication impairment" in their title or abstract were considered, leaving 61 articles. After a full-text analysis that considered the inclusion and exclusion criteria, a final selection of 14 articles was obtained, as shown in Figure 1.

Characteristics of the Studies

The 14 articles included in the systematic review and presented in Table 1, were conducted in five countries: the United States of America (n=7), Australia (n=4), New Zealand (n=1), India (n=1), and Brazil (n=1). Concerning methodology, five are review articles, three are case-control studies, three address specialists' knowledge about CCD, two studies are retrospective, and one is correlational. The etiologies include traumatic brain injury (n=6), right hemisphere brain injury (n=5), burn injury (1), Parkinson's disease (n=1), and hippocampal amnesia (n=1).

Table 1. Synthesis of the selected studies.

Authors and Year of Publication	Country of origin	Type of Study	Etiology	Cognitive-Communication Clinical Characteristic
(Larkins, 2007)	New Zealand	Discussion	TBI*	Executive impairments.
(Kurczek & Duff, 2011)	USA	Case-Control	Hippocampal Amnesia	Impairments in discourse cohesion and coherence. Explicit memory impairment.
(Cornis-Pop et al., 2012)	USA	Literature Review	TBI*	Memory, attention, and processing speed impairments.
(Tompkins, 2012)	USA	Special Communication	RHBD**	Attention, memory, executive functions, and visual processing impairments. Receptive and expressive communication aprosodia. Difficulty with inference and maintaining conversation topics.
(Barman et al., 2016)	India	Literature Review	TBI*	Attention, memory, and executive function impairments.
(Hendricks et al., 2017)	USA	Retrospective Study	BI***	Attention, memory, and problem-solving impairments.
(Hewetson et al., 2017)	Australia	Retrospective Study	RHBD **	Difficulty in establishing a connection between language and context.
(Tran et al., 2018)	Australia	Correlational	TBI*	Difficulty in understanding statements of greater length and complexity. Difficulty in understanding implicit and abstract content. Inability to acquire new learning through language and communication.
(Swales et al., 2019)	Australia	Exploratory-Descriptive Study	PD****	Impairments in working memory, attention, and executive functions.
(Shorland et al., 2020)	Australia	Exploratory Review	TBI*	Impairments in working memory, executive functions, processing speed, and social cognition. Disorganized and off-topic speech. Difficulty in the facial recognition of emotions. Poor conversational speech.
(Ramsey & Blake, 2020)	USA	Exploratory-Descriptive Study	RHBD **	Anosognosia, Aprosodia, and attentional impairments. Deficit in pragmatics, prosody, metaphor comprehension, sarcasm, and ironic language.
(Myers et al., 2022)	USA	Case-Control	TBI*	Deficit in the use of pragmatic language. Disturbances in global discourse coherence.
(Rodriguez et al., 2022)	Brazil	Case-Control	RHBD **	Errors in global discourse coherence.

				Greater number of words in speech, with less informative content.
(Sheppard et al., 2022)	USA	Systematic Review	RHBD **	Deficit in linguistic prosody (associated with pragmatism, turn-taking), comprehensive and expressive. Deficit in emotional prosody (melodic line), comprehensive and expressive. Deficit in facial recognition.

* Traumatic Brain Injury; ** Right Hemisphere Brain Damage; ***Burn Injury; **** Parkinson's Disease

Clinical Characteristics Found in the Studies

A categorical analysis was performed to determine if the review could account for possible diagnostic sub-classifications. This began by identifying the clinical characteristics in the extraction table. Difficulties were identified in 13 skills, namely executive function, attention, working memory, problem-solving, processing speed, declarative memory, speech, prosody, inferences, conversational topics, facial recognition, and other pragmatic skills.

Subsequently, each of these skills was incorporated into macro categories. Initially, the 13 skill difficulties were synthesized into 5 categories of impairments: executive function, pragmatic, prosodic, facial recognition, and discourse. Deficits in working memory, executive function, attention, problem-solving, and processing speed were considered as part of the executive function impairments. The pragmatic impairments included inferential and conversational topic disturbances, besides the difficulties explicitly mentioned in the studies.

In the second synthesis, prosodic and facial recognition disturbances were grouped under the category of pragmatic impairments, resulting in three new categories: executive function impairments, pragmatic impairments, and discourse impairments.

Finally, discourse impairments were not considered as an independent category given that deficits in executive function can explain difficulties in syntactic structuring in long-length utterances, limitations in comprehension due to the possibility of information retention, or maintaining attention with a communication partner. These difficulties can also be understood from the perspective of contextual pragmatic deficits, such as the inability to identify implicit information, prosody, and facial expressions. Thus, this synthetic categorical analysis presents two groups: the executive group (based on characteristics reported in 4 of the 14 reviewed articles) and the pragmatic group (based on characteristics reported in 4 of the 14 reviewed articles). Additionally, a mixed executive-pragmatic group is proposed, considering that the clinical characteristics found in some of the studies include components of both categories (as reported in 6 of the 14 reviewed articles).

Executive Group

Based on the results, it can be established that the clinical findings related to the basic cognitive skills in individuals with CCD are somewhat homogeneous. Regardless of their etiology, these characteristics encompass deficits in memory (Kurczek & Duff, 2011), attention, and executive functions (Barman et al., 2016; Cornis-Pop et al., 2012; Hendricks et al., 2017; Larkins, 2007; Shorland et al., 2020; Swales et al., 2019; Tompkins, 2012).

Pragmatic Group

This homogeneity is also observed in pragmatic communicative skills. Regardless of their etiology, this group includes prosodic (Ramsey & Blake, 2020; Sheppard et al., 2022; Tompkins, 2012), inferential, and abstraction deficits (Ramsey & Blake, 2020; Shorland et al., 2020; Tompkins, 2012; Tran et al., 2018). Additionally, difficulties in maintaining conversational topics, speech coherence, and recognizing facial expressions are considered (Hewetson et al., 2017; Myers et al., 2022; Rodriguez et al., 2022; Sheppard et al., 2022; Shorland et al., 2020; Tompkins, 2012).

DISCUSSION

This study aimed to determine whether characteristics observed in persons with CCD could be grouped, thereby generating sub-classifications of the disorder. To achieve this objective, a systematic review and categorical analysis were conducted to gather different clinical characteristics and subgroups. The results lead to the conclusion that subclassifying CCD is feasible, detecting three potential groups: Executive group, Pragmatic group, and Mixed group.

The first group is primarily associated with the cognitive component of CCD. Analysis of cognitive difficulties found in the reviewed studies shows the convergence of three recurring difficulties in people with CCD: working memory, attention, and executive functions. While both attention and working memory are differentiated cognitive functions, evidence indicates that both are encompassed within the classical concept of executive function, alongside other skills such as planning, cognitive flexibility, and inhibition (Coello-Zambrano & Ramos-Galarza, 2022; Cristofori et al., 2019; Delgado-Mejía & Etchepareborda, 2013). These cognitive skills are recognized as independent but belong to the executive function model based on factorial analyses (Tirapu et al., 2017). Therefore, it is decided that the most appropriate label to describe this cognitive-based set of difficulties is that of executive impairments.

There is broad consensus that impairments in executive function (EF) can lead to deficits in communication. These difficulties have been observed in both the lexical-semantic and morphosyntactic components, at the comprehensive and expressive levels (de la Hoz et al., 2021). More specifically, it is proposed that disturbances in working memory affect the ability to comprehend lengthy statements, whereas attentional deficits result in difficulties in turn-taking. Furthermore, deficits in planning are thought to explain difficulties in morphosyntactic production (Ambiado-Lillo et al., 2020). Thus, the communication difficulties exhibited by individuals in the executive group are understood from the cognitive foundations that support linguistic performance, corroborating the classical framework (Behn et al., 2019).

The second group stems from the communicative component of CCD, showing the convergence of five recurring difficulties in individuals with this disorder: prosodic deficits, limitations in recognizing facial expressions, discursive incoherence, difficulty in maintaining conversational topics, and challenges in understanding inferences and abstractions. All these characteristics are inherently related to pragmatics in one way or another, thus prompting the categorization as predominantly pragmatic.

According to classical pragmatic theory, communicative characteristics can be analyzed through three dimensions: locutionary, illocutionary, and perlocutionary. The locutionary dimension involves aspects related to linguistic form, such as phonology and morphosyntax; the illocutionary dimension pertains to communicative intention; and the perlocutionary dimension seeks to achieve a specific effect on the other speaker (Gallardo-Paúls, 2005). Based on this, it can be determined that illocutionary and perlocutionary aspects are most affected in the predominantly pragmatic group.

The above is because the skills that are affected within the pragmatic group are considered essential components of communication but do not directly impact linguistic structure (Saul et al., 2023) or the locutionary function of language (Gallardo-Paúls, 2005). Instead, they are oriented towards discursive interpretation (Gibbs, 2023). It is noteworthy that all these skills enable fluid and contextualized interaction with other speakers in society (Martí, 2021).

In this context, evidence indicates that abstraction difficulties in individuals with CCD (Ramsey & Blake, 2020; Swales et al., 2019; Tompkins, 2012; Tran et al., 2018) lead to disturbances in deixis, a function aimed at referencing discursive information without a specific referent (Pinheiro et al., 2022). This is exacerbated by deficits in prosodic processing (Ramsey & Blake, 2020; Sheppard et al., 2022; Tompkins, 2012) and difficulties in identifying facial expressions (Hewetson et al., 2017; Myers et al., 2022; Rodriguez et al., 2022; Sheppard et al., 2022), which explains the challenges in the actions required to infer implicit content during communication.

It should be noted that according to the reviewed literature, there are people presenting characteristics from both groups, forming a third group (executive-pragmatic). In summary, our proposal for the clinical classification and conceptualization of CCD is as follows:

> CCD is a neuropsychological disorder characterized by any cognitive impairment that directly affects a person's communicative process, whether verbal or non-verbal, provided it is not a primary language disorder. It can be classified into Executive CCD (eCCD), Pragmatic CCD (pCCD), and Executive-Pragmatic CCD (epCCD). Within this framework, eCCD refers to any neuropsychological disorder presenting deficits in executive functions, which consequently disrupt typical linguistic and communicative processes. pCCD, on the other hand, refers to any neuropsychological disorder exhibiting deficits in pragmatic skills that facilitate social contextualization, similarly impacting typical linguistic and communicative processes. Finally, epCCD encompasses any neuropsychological disorder featuring deficits in both executive functions and pragmatic skills, thereby disrupting typical linguistic and communicative processes.

We believe that the conceptualization of each disorder group presented here is concise, leaving no room for ambiguities. Moreover, they exclude etiological or neuroanatomical

characteristics that may underlie them, as the focus is on clinical features. However, it should be noted that various etiologies can lead to CCD. It has been documented, for instance, that individuals with COVID-19 may develop CCD (Ramage, 2020). On the other hand, it is crucial to highlight that the impact on autonomy resulting from CCD is not a diagnostic criterion but rather indicates the level of severity of the disorder in daily living. Additionally, the presence of CCD does not exclude the possibility of other neuropsychological conditions. Lastly, while the analysis has been aimed at the adult population, the proposed classification is equally applicable to children, considering that the disorder is not limited to adults alone (Morrow et al., 2021).

Regarding severity, following the guidelines established by the World Health Organization (WHO, 2001), we propose three levels: (1) Mild, where cognitive and communicative deficits can be found but do not significantly impact the communicative activities of individuals; (2) Moderate, where cognitive and communicative deficits restrict the communicative activities of the person; and (3) Severe, where the cognitive and communicative impairments restrict the social participation of individuals.

Implications for Speech-Language Therapy

We believe that the proposed clinical classification will have a significant impact on the speech-language therapy process, as it will allow for the implementation of guidelines focused on specific strategies for each of the sub-classifications. This will facilitate the development of new therapeutic approaches, which are currently in their early stages.

Limitations and Projections

Finally, we consider that the main limitation of this study was not including the clinical characterization of major neurocognitive disorders (MND), as no articles addressing the topic met the inclusion criteria. Despite this, future research focusing on the relationship between the proposed clinical classification and MND could address this limitation. Additionally, it is anticipated that this clinical classification will guide the development of assessment tools and therapeutic proposals that are currently essential for contemporary speech-language therapy practice.

CONCLUSIONS

Based on the evidence presented here and its alignment with our research objective –to identify various clinical characteristics in the literature and propose a clinical sub-classification for Cognitive-Communication Disorder (CCD) based on people's communicative performance– it can be concluded that this objective has been thoroughly achieved. The convergence of cognitive-communicative characteristics within the mentioned groups results in sub-classifications that optimally align with the distinctive neuropsychological features of individuals with CCD.

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