**Why is measuring communication difficult? A critical review
of current speech pathology models and measures**

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Abstract

Human society is organised through communicative interactions between co-present people. Speech pathology (SP) assessment and intervention strategies aim to access these sites of communication in order to facilitate participation in life situations for people with communication disorders. Surprisingly, however, there is no explicit theory of communication underpinning SP practice and research. As a result, the conceptual and practical basis for rigorous, empirical measurement of communication remains limited, which is a significant challenge for professional practice and research. This critical review discusses the prevailing ways that co-present communication has been conceptualised and measured in SP. In particular, we examine how models of health have informed current ideas and measurement practices. We argue that, although patently valuable for SP, they are largely incommensurate with the realities of co-present communication. Drawing on current empirical research in Sociology and Linguistics, we specify the properties of real time co-present communication, and discuss their relationship to current SP concepts and measurement practices. We conclude by suggesting directions for conceptual development and empirical research that will draw SP assessment and intervention strategies closer to real time co-present communication.

Key words: Communication, speech pathology, enchrony

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INTRODUCTION

Human society is largely organised and maintained through communicative interactions between co-present (i.e. face-to-face) people. The business of homes, laboratories, schools, hospitals, etc. rely on the collaborative actions of the people gathering in these sites.[1] Although the physical and artefactual environments are consequential, people largely manage their affairs by manipulating their own semiotic (i.e., meaning-making) resources, such as talk, gesture, facial expression, gaze, and body position. Of these resources, talk is the most powerful for shaping communicative interactions. That is, people regulate everyday life largely through talking-in-interaction with others.

People who have communication disorders experience impairments to the body functions and structures supporting speech, language, and cognition. To varying degrees, these impairments constrain the ability to use talk in co-present interactions, resulting in altered, disrupted, or restricted participation in routine life activities. Speech pathologists are responsible for providing assessment and intervention for people with communication disorders, and speech pathology (SP) interventions should ultimately facilitate participation in life situations. However, to date, co-present communicative interactions have not received conceptual or practical investment commensurate with their importance. That is, the theoretical and practical basis for rigorous, empirical measurement of routine, co-present communicative interactions remains limited. The reasons for this gap are complicated, varied, and broadly understandable, but it is nonetheless a significant challenge for research and professional practice in communication disorders.

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[1] This "gathering" may of course be technology-mediated (e.g. via video-conferencing). Nonetheless, technology-mediated communication can still be meaningfully considered as "co-present" in the sense that a set of embodied individuals are communicating in real time.

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This critical review is divided into three parts. In Part 1, we discuss and critique the prevailing ways that co-present communication has been conceptualised and measured in SP research and practice, and then outline the properties of co-present communication that SP concepts and measures must address. In Part 2, we offer a comprehensive conceptual framework for approaching communication—"MOPEDS" (Enfield, 2014)—which is inclusive of the cognitive processing and linguistic systems supporting communication. In Part 3, we synthesise the arguments developed in Part 1 and Part 2, and discuss their possible implications and benefits for SP research and practice.

PART 1: MODELS AND MEASUREMENT OF CO-PRESENT COMMUNICATION IN SP

The importance of communication for everyday life is prominently enshrined in the documentation of professional SP bodies around the world (e.g. American Speech-Language-Hearing Association, 2016; Speech Pathology Australia, 2015). Communication is treated as the uniting coherency across the profession's scope of practice, and the topic of its self- and consumer advocacy (e.g. The International Communication Project, https://internationalcommunicationproject.com/). While this encompasses communication mediated by written language, most areas of SP practice focus on competencies and behaviours supporting communication between co-present people via talk and other semiotic resources (e.g. gesture, signing, eye gaze, augmentative and alternative communication systems). There is, however, no single accepted model of co-present communication for SP practice.

The models of co-present communication that have been employed historically in SP research, education, and practice have tended to be schematic, mechanistic, message-oriented models, e.g. the "speech chain" (Denes & Pinson, 1963). That is, communication is depicted as a process whereby individuals who

share abstract linguistic knowledge "broadcast" to one another. The objective of communication is characterised as exchanging "ideas" and/or "information", and motivated by "needs" or "desires". These sorts of models aren't usually intended as comprehensive explanations of communication, and function primarily to demonstrate the complexity of hearing, language, and cognition. For example, in many introductory SP textbooks, this kind of model is presented near the beginning of the text and, once registered, rarely mentioned or used in subsequent parts, which focus on impairments of speech, language, and cognition (e.g. Anderson & Shames, 2006; Justice & Redle, 2014). Nonetheless, they provide for a conception of communication as an inevitable outcome of people being co-present, motivated to provide one another with information, and possessing a common linguistic competence. Communication is therefore depicted as the sum of individual competencies, which are largely separable from the particular communication situation at hand, and the semiotic aspects of communicative acts remain unexplored. It is also worth noting that this is part of a wider trend of conceptualising language as only, or primarily, an abstract, cognitive representational system, which is entirely separable from its use for communication (cf. Armstrong, 2005; Armstrong & Ferguson, 2010).[2] Language structure (i.e. phonology, lexis, morphology, syntax) then becomes decoupled from communication, which naturally blurs and obscures its contextually sensitive features and their variation. More recently, a number of authors have offered conceptual models for various kinds of "social communication" disorders (e.g., Izaryk and Skaris-Doyle, 2017; MacDonald, 2017). Although welcome and thoroughly interesting, these models continue to individualise language and

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[2] For many linguists, of course, this is the foundational casting point of their discipline. Others reject this notion wholeheartedly (e.g. Evans & Levinson, 2009).

communication, while—as arguments below will elaborate—collecting causally diverse phenomena together under the same conceptual frame.

Models of health and disability have also influenced how SP conceptualises co-present communication. The broad acceptance of the International Classification of Functioning, Disability and Health (ICF) (WHO, 2001) has formalised the profession's recognition of health conditions as fundamentally biopsychosocial, i.e. as emerging from a complex interplay between an individual's micro and macro circumstances (e.g. Ma, Threats, & Worrall, 2008). While the ICF does not offer, nor is it intended as, a theory of communication, its component structure and coding schemes are consistent with the prevailing "broadcast" model outlined above. This is unsurprising given that the ICF addresses individual functioning (Buntinx and Schalock, 2010; Rasmussen, 2016; Walsh, 2011). Within the Activity component, the ICF provides a detailed scheme for coding Communication (Chapter 3). It includes distinct categories for various kinds of co-present communication (e.g. "Conversation" d350), and the individual skills that sustain it, e.g. "Communication - receiving" (d310 - d329) and "Communication - producing" (d330 – d349). As Worrall and Hickson (2008, p. 76) note, learning, social, and relational functions mediated by communication are coded separately. There are also qualifiers that relate to "performance" and "capacity" for the Activity and Participation components. The performance qualifiers address how an individual functions in their current, routine environment, whereas the capacity qualifiers address how they function in maximally supportive environments, and environments that are "standardised", i.e. those that provide neither supports nor barriers. Provision for contextual variation appears to expand the scope of view beyond the individual. However, the notion that a communicative environment can be "standardised" or "neutral" indicates that the target here is an abstracted perspective on an individual's inherent communicative

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abilities. So, the result is again a fundamentally individual locus for communication, tied to an individual's competencies, which can be considered independently from the particulars of specific communication situations (see Krummheuer, Klippi, Raudaskoski, and Samuelsson, 2016; and Rasmussen, 2016, for similarly motivated discussions).

It should also be noted that many SP practices for measuring communication have proven troublesome to reconcile with the ICF. One, perhaps coarse reflection of this trouble is the relative scarcity of SP assessment tools specifically directed to the Activity component (O'Halloran and Larkins, 2008; Wallace, Worrall, Rose, & Le Dorze, 2017; Xiong, Bunning, Horton, & Hartley, 2011; although, see Baylor et al., 2013). At a more fundamental level, though, researchers and clinicians have experienced difficulty with mapping communication phenomena to the Activity component. As Walsh (2011) argues, this is partially attributable to category errors involving Body Functions and Structures and Activity. That is, most behavioural assessment practices employed to establish the nature and severity of communication disorders are measures of Activity, despite the fact that they have been conventionally considered to be measures of Body Functions and Structures.[3] In addition, as we will come to demonstrate, the individualised, abstracted perspective on communication encoded in the Activity component of the ICF is mismatched to the empirical reality of co-present communication.

SP measurement practices purporting to directly address co-present communication are fewer, and less well developed than those addressing speech, language, voice, and fluency. In particular, there are very few measures that directly

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[3] We should note that many authors have recognised, and correctly addressed, this issue (e.g. Dykstra, Hakel, & Adams, 2007; Westby & Washington, 2017). However, others have persisted with the category error. For example, McLeod and McCormack's (2007, p. 255) case for assigning speech intelligibility to Body Functions and Structures is particularly underwhelming.

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and empirically capture the realisation of communication in real time. Most measures oriented towards real time communication are observational and/or judgement-based, such as checklists and rating scales (e.g. Adams, Gaile, Freed, & Lockton, 2010; Prutting & Kirchner, 1987; Kagan, Winckel, Black, Duchan, Simmons-Mackie, & Square, 2004; O'Halloran, Worrall, Toffolo, Code, & Hickson, 2004; Togher, Power, Tate, McDonald, & Rietdjik, 2010; see also Adams, 2002, for a related review). There are also measures that use real time communication as a source of input (e.g. "connected speech" samples, discourse samples), but are ultimately concerned with the linguistic characteristics of the sample (e.g. productivity, lexical diversity, clausal density) rather than the semiotic properties of communicative acts themselves (see Bryant, Ferguson, and Spencer, 2016 for a review of such measures). Another common set of SP measurement strategies for communication involve reporting on the content or outcomes of communication. These measures usually require the person with the communication disorder or their significant others to document their general experiences with communication over longer periods of time, and its impact on everyday life activities (e.g. Baylor et al., 2013; Bishop, 2003; Douglas, Bracy, & Snow, 2007; Frattali, Thompson, Holland, Wohl, Ferkectic, 1995). For these measures, it is the experience of communication that is brought into focus, rather than co-present communication in real time.

There are historical and pragmatic reasons for these prevailing measurement strategies. Modern SP practice has been strongly influenced by medicine, linguistics, and psychology (Speech Pathology Australia, 2008). As we have argued so far, this has furnished a dominant, often implicit, conceptual approach to language and communication that is biased towards the abstract, systemic, and cognitive properties of these phenomena. In addition, it has generated a methodological orientation that equates adequate and accurate empirical measurement with

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constrained elicitation of targeted behaviours with a view to their quantification (cf. Izaryk & Skaris-Doyle, 2017, p. 1225). The complexity of co-present interaction poses substantial challenges for such an approach; its timing, multimodality, and variability are resistant to singularly cognitive explanations, and concise behavioural description. Measurement strategies like checklists, rating scales, and report measures are therefore understandable techniques for distilling these highly complex phenomena, and then transforming them into quantitative values. This also allows for their integration into experimental research paradigms, and development into procedures for SP assessment and intervention. This should not be read as dismissive of experimentation, quantification, or standardisation; experimental research is a valid way of generating (certain kinds of) knowledge, and clinicians need robust methods for carrying out SP tasks. Our reservation is that the short term gains offered by pragmatically eliding the complexity of co-present communicative interactions will be offset in the longer term by the persistence of conceptual confusion, category error, and indirect and imprecise measurement. Instead, we suggest that the solution is not to avoid the complexity of co-present communication, but to embrace it.

WHAT ARE THE PROPERTIES OF CO-PRESENT COMMUNICATION?

Our discussion so far has claimed that current SP concepts and measurement practices do not adequately address the empirical reality of co-present communicative interaction. We will now develop this argument by outlining what we take as its fundamental properties. In particular, we will suggest that co-present communicative interactions are: *dynamic*, *public and multimodal*, *reflexive and accountable*, and *local and collaborative*. These properties are simultaneously present in each and every moment of co-present communication. As such, accurate

measurement of communication must be sensitive to them. We should note that our perspective is primarily informed by an ethnomethodological, conversation-analytic approach to social organisation, and the discipline of interactional linguistics that has emerged from it (see, e.g. Couper-Kuhlen and Selting, 2018; Garfinkel, 2002; Sidnell and Stivers, 2013). To support this discussion, we will make reference to Fig. 1, which depicts a small segment of interaction involving a man who has experienced a right hemisphere stroke ("Bill"), his spouse ("Adrienne"), and their mutual friend ("Carli"). They have been talking together over lunch and, in this small segment, Bill asks Carli to pass him a jug of water.

((Insert Table I around here))

((Insert Fig 1 around here))

Properties

Dynamic. Co-present communication has a finer and faster temporality than our intuitions might suggest. Behaviours as fast as tenths of seconds are routinely treated as meaningful. As a consequence, people are dynamically monitoring one another's conduct for how it contributes to the unfolding communication situation. A clear example of this is the temporal organisation of turn-taking (e.g. Levinson, 2016; Sacks, Schegloff, & Jefferson, 1978; Stivers et al., 2009). For instance, Stivers et al. (2009) found that, across 10 diverse languages, the mean response offset between questions and answers in everyday conversation is 208 milliseconds (cf., e.g., Fig. 1 Lines 3-6; 11-14). The dynamic temporal organisation of co-present communicative interaction pervades and constrains its other properties.

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Public and multimodal. The behaviours that people pay attention to in the course of co-present communication are diverse. People monitor the phonetic/phonological, lexical, morphological, syntactic, prosodic, and discursive realisation of talk, as well as visible, multimodal conduct like gaze, facial expression, body positioning, and body movement (Goodwin, 2013; Enfield & Sidnell, 2017). In addition, these behaviours interlock with aspects of the material environment (e.g. objects, furniture, rooms). Turning to Fig. 1, we can see that Bill's request (line 8-10, Image 2) employs talk and a gesture that are designed to make salient certain aspects of the material environment; namely, the water jug. It is interesting to note that Carli responds to Bill's request before he has even named the targeted object. So, here, Carli has been able to synthesise Bill's talk, body movement, and the material world to make holistic sense of the social and communicative scene before her (cf. Goodwin, 2013). In this way, the phenomena of co-present communicative interactions are "public", i.e. visible in the details of people's behaviours.

Reflexive and accountable. In order for communication to occur, the parties communicating must jointly recognise the reflexive and accountable nature of social action (see Enfield, 2013; Garfinkel, 2002; Heritage, 1984). Reflexivity and accountability concern the ongoing, incremental processes of interpretation and production during co-present communication. Every act is "reflexive" in the sense that it both defines and constitutes the social situation being enacted. For example, by talking, moving, sitting, gazing, etc. in particular ways, Bill, Adrienne, and Carli can demonstrate that they are "having a causal meal", as opposed to "having a business lunch", or "holding a wake", or whatever else. In addition, and at a finer level of detail, Bill's production of (what will turn out to be) a request at line 8 simultaneously defines the context in which it was produced (i.e., as a suitable

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moment to initiate a communicative act), while at the same time arranging the semiotic resources necessary for his request. Carli's response then defines Bill's acts *as* a request, while at the same time providing a basis for her own acts to be analysed by others as (what will turn out to be) a complying response. All of these behaviours are pervasively "accountable", in the sense that they set a standard by which one might be evaluated (Enfield, 2013, p. 7). For example, Bill's request implements normative expectations about who is responsible for responding (i.e., Carli), and how they should do so (i.e., by promptly passing the water jug). As a consequence, Bill may reasonably expect Carli to comply with his request—and may seek redress if she does not—but he is not entitled to apply such expectations to Adrienne. In summary, signifying and responding subject to normative expectations is the semiotic backbone of co-present communication (Enfield, 2013), publicly demonstrating the ways that people are interpreting the unfolding communication situation.

Local and collaborative. The reflexive and accountable nature of co-present communication is fundamentally collaborative. That is, the people involved in any communication situation must mutually sustain it, and its organisation is not reducible to the contributions of any single party (e.g. Enfield, & Sidnell, 2017, p. 65-66; Goodwin, 2003). More than that, co-present communication is characterised by the specific features of the communication situation at hand, and the people who are enacting it. The interaction depicted in Fig. 1, for instance, takes place between people with specific shared histories, relevant identities (e.g., as long-term friends, spouses), and communicative objectives (e.g., to "catch up"), and they are positioned on, beside, and nearby objects of varying functions and characteristics, each of which is differently relevant for the communication situation (e.g., chairs vs. food). So, every time people engage in co-present communication, it is inextricably localised,

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and sensitive to the precise characteristics of the communication situation and its contributing parties (cf. Schegloff, 1993).

Properties vs. common SP measures

How do common SP measures of communication address these properties? Let's consider a clinician who is aiming to evaluate the communication of a person with traumatic brain injury, and who is (very reasonably) intending to use observational clinician ratings, and client- and significant-other report measures. One important limitation of her chosen measurement strategies is that they are removed from the temporality of co-present communication. It is plausible that her observational measures might capture her perceptions of temporality, but they are not designed to directly document the level of detail to which co-present communication is organised. So, our hypothetical clinician may well notice that the conversational turns of her client are consistently delayed, but not by how long, or how often, or under which circumstances. Another important limitation is that observational measures and report measures tend to elide many of the public, multimodal features of co-present communication. In a sense, this is what they are designed to do, i.e. restrict the focus of measurement to a smaller set of behaviours. So, she is likely to experience difficulty systematically and comprehensively documenting the lexical, syntactic, prosodic, etc., behaviours relevant for her client's turn-taking unless they are specified on, for example, her rating scale. In fact, many SP measures of communication render complex behaviour like turn-taking into a binary or ordinal choice (e.g. Adams et al., 2010; Prutting & Kirchner, 1987; Kagan et al., 2004; O'Halloran et al., 2004). Perhaps most importantly, though, these common SP measures of communication are unable to grasp the reflexive and accountable sense-making that people engage in during co-present communication. In the case of

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observational measures, this sense-making is at least filtered through the observer, and their objectives for observation. For example, our clinician is administering a rating scale measure to capture features of communication with a view to her professional tasks, but the people being observed are communicating with a view to their own objectives as a student and teacher, a husband and wife, an employee and employer, etc. These limitations are magnified for report measures. That is, they are entirely outside the real-time sense-making of the people reporting on them, rendering the specific features of people's communicative behaviours entirely unrecoverable.

In summary, the intrinsic characteristics and specific design features of observational and report measures are ill-suited to capturing the lived details of real time co-present communication. A relevant question to consider next is whether these limitations are meaningful for SP research and practice. Returning to our hypothetical clinician and her client, one may reasonably ask whether it is necessary to document precise delays before the speaking turns of a person with traumatic brain injury, or their co-ordination of gaze with talk, or the way their spouse is asking questions, or whatever else. One, perhaps glib, response is that empirically documenting phenomena of interest is straightforwardly sensible. The public, multimodal organisation of co-present communication is an opportunity for rich and diverse measurement, which has the potential to provide valuable empirical evidence to support SP assessment and intervention. For assessment, it would allow our clinician to directly link specific (linguistic, and other) behaviours attributable to impairments of speech, language, and cognition with their communicative manifestations and consequences (Wilkinson, Beeke, & Maxim, 2003, p. 80). These observations would also complement and qualify information gathered through testing measures, and help to characterise the nature and severity of her client's

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communication disorder. In addition, it would provide a very direct way of accessing, in ICF terms, Activity Limitations, Participations Restrictions, and Environmental Factors, i.e. the moment by moment lived experience of (communication) disability (cf. Barnes, 2014, p. 146-147). For intervention, documenting the detail of co-present communication would generate specific behaviours to target in intervention, and provide a basis for meaningful outcome measurement. On the other hand, if our clinician were to persist with her chosen, more indirect measurement strategies, she would be excluded from these details. This effectively perpetuates the use of assessment and intervention strategies that have a questionable relationship to the reality of communication, i.e. *questionable validity*.

A second question one might raise—both for our clinician, and more generally—concerns the feasibility of documenting and analysing real time co-present communication. Before one begins to consider the technicalities involved with documenting and robustly analysing it (not to mention the skills and time involved!), there are pressing conceptual problems to address (cf. Izaryk & Skaris-Doyle, 2017). As we have argued, the conceptual technology that pervades SP research and practice is not aligned with the reality of co-present communication. So, the challenge of measurement is likely to be overwhelming or piecemeal without a guiding framework and suitable analytic concepts and methods.

PART 2: A CONCEPTUAL FRAMEWORK FOR COMMUNICATION

In the absence of an overarching model of communication (Schindler, Ruoppolo, & Barillari 2010; Speech Pathology Australia, 2008; Walsh, 2011), the ICF has been routinely treated as a foundational conceptual starting point for SP practice (although, see Ferguson, 2008, for an alternative, critical standpoint). As we have discussed so far, the ICF does not provide adequate conceptual nuance for accurately

or comprehensively addressing co-present communication. It must therefore be elaborated with discipline- and phenomena-specific theoretical perspectives (cf. Worrall and Hickson, 2008, p. 73). In this section, we shall introduce parts of a conceptual framework proposed by Enfield (2014), which he has termed "MOPEDS".[4] Enfield's (2014) MOPEDS model is intended as a comprehensive framework for studying and explaining language. Our aim with this discussion is not to equate SP practice to linguistic research. By introducing this model, we are seeking to disentangle the phenomena that mediate co-present communication with a view to improving the conceptual and practical footing of SP. In particular, we shall focus on the "Microgenetic", "Enchronic", and "Synchronic" components of the MOPEDS model, and argue that appreciating the different phenomena they address is a central casting point for rigorous analysis of co-present communication.

The MOPEDS framework

Enfield (2014) argues that complex phenomena like language cannot be reduced to isolated biological, psychological, social, or historical explanations. Instead, language must be understood through multiple sets of complementary explanatory "frames". These frames are distinguished by their contents (i.e. phenomena), and the mechanisms that mediate their operation, i.e. what causes the phenomena to be the way they are. This is closely related to (but distinctive from) the temporal character of the frames and their phenomena. This section will now proceed by defining and discussing each frame in turn.

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[4] This is an acronym for the different causal frames Enfield (2014) has proposed for studying language; namely: *Microgenetic*, *Ontogenentic*, *Phylogenetic*, *Enchronic*, *Diachronic*, and *Synchronic*.

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Microgenetic. The microgenetic frame encompasses phenomena relevant to the real-time psychological *processing* of language and communication. A microgenetic view on language and communication might therefore be concerned with, for example, the cognitive processing mechanisms supporting word production, motor planning for speech, or attribution of speaker intention. These phenomena are ephemeral, with durations of milliseconds at the faster end, and seconds at the slower end. Enfield (2014) suggests that the causal mechanisms shaping phenomena located in the microgenetic frame are the processing stages, biases, and limits of human cognition.

Enchronic. The enchronic frame brings into focus the phenomena mediating the practical accomplishment of communication. It is concerned with the semiotic mechanisms and behavioural practices involved with interpreting and producing successive communicative acts. As we have discussed in the preceding sections, its central causal mechanisms are reflexivity and accountability. The phenomena that reside in the enchronic frame are slower than most microgenetic phenomena, but are still organised in tenths of seconds at the faster end.

Synchronic. The phenomena of the synchronic frame are the complete sets (i.e. systems) of items relevant for language and communication. When approaching language and communication from a synchronic perspective, the objective is to describe the enduring systems of relations between the items in the set; contrasts between sets of pronouns, morphemes, phonemes, and whatever else. Enfield (2014, p. 16) elaborates the complexity of this perspective, suggesting that it might be seen as an atemporal abstraction, or a "purely methodological move". Nonetheless, he argues for the reality of the synchronic frame as, in many cases, a depiction of the enduring systems of (mental) conceptual representations. The causal factors in this

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frame are the nature of the relationships between items in the system, and the ways that enduring systems of conceptual representations are developed and used.

MOPEDS, co-present communication, and SP

Successful communication in co-present interaction can be concretely understood through each of these three causal frames. For example, successfully speaking is reliant on microgenetic processing, some of which will activate synchronic representations, and implicate synchronic choices. The properties of the enchronic frame pressure and constrain these microgenetic and synchronic phenomena, while also providing for their intelligibility as communicative acts. For example, the dynamic nature of co-present communication pressures people to speak promptly (i.e., engage in efficient processing), and to use lexis, syntax, and prosody (i.e., employ systemic contrasts) suited to the communicative task at hand. In addition, the reflexive and accountable nature of enchrony drives the ascription of meaning to, for example, particular lexical and syntactic choices in a given communication situation (Enfield & Sidnell, 2017). Returning to Fig 1., Bill's use of interrogative syntax was not heard as an information-seeking question, nor was his use of the verb "pass" taken to be concerning death, or the passage of time. Instead, these synchronic choices were tied to the particulars of communication situation, providing for Carli's prompt analysis of them a request to transfer the water jug. In summary, then, the phenomena encompassed by these frames are highly interrelated, with microgenetic and enchronic processes interlocking temporally.

Let's now consider how these three causal frames of MOPEDS provide a basis for conceptualising a communication disorder; for instance, aphasia. Beginning with the phenomena of the microgenetic frame, aphasia reduces the efficiency of language processing, altering the time course and strength of lexical and syntactic activation,

for example. Moving on to the phenomena of the synchronic frame, aphasia may affect some of the conceptual representations upon which language relies. The relative contributions of linguistic processing (i.e. microgenetic phenomena) versus linguistic representations (i.e. synchronic phenomena) to the symptoms of aphasia has been a source of debate and controversy in aphasia research (see, e.g. Caplan, 2006; Kalinyak-Fliszar, Kohen, & Martin, 2008, p. 1096; relatedly, also see Botting and Marshall, 2017, on domain-specific vs. domain-general explanations of specific language impairment). However, a synchronic perspective on aphasia would also be inclusive of the systemic restrictions it causes, e.g., how aphasia reduces the sets of contrastive lexical, morphological, and syntactic resources available to a person with aphasia (see, e.g. Armstrong and Ferguson, 2010; Bastiannse, 2013). Lastly, on the phenomena of the enchronic frame, aphasia restricts and reshapes the role of talk in regulating communication, and in implementing communicative acts. In particular, it inhibits the achievement of reflexive and accountable contributions to co-present communication. This necessitates an increased burden on other semiotic resources (e.g., facial expression, gesture), and/or an increase in repair activities (see, e.g. Barnes, 2014; Goodwin, 2003).

What benefits does this mapping to MOPEDS offer for SP research and practice? Many readers will likely see parallels between the ICF and the MOPEDS frames we have discussed. In particular, the microgenetic and synchronic frames correlate to aspects of Body Functions and Structures. However, the different phenomena encompassed in these frames are not routinely distinguished in SP assessment and intervention. There are a variety of potential conceptual and practical benefits to making these distinctions (e.g. more accurate diagnosis, better specification of treatment mechanisms and effects), but we cannot elaborate on them here. Nevertheless, we can register that MOPEDS includes conceptual distinctions

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that offer a finer, more felicitous characterisation of phenomena central to understanding how cognition is affected by communication disorders.

Returning to the focus of our critical review, what benefits does an enchronic perspective offer relative its approximate correlates in the ICF? As we have argued, the individualist presumptions underlying the ICF notion of Activity means that it is conceptually inapt for enchronic frame phenomena. Participation might therefore offer more meaningful links between enchrony and the ICF. However, as O'Halloran and Larkins (2008) detail, distinguishing the scope of Participation and its relationship to Activity has proven challenging. They link Activity to specific, more individually focused tasks and capacities, and Participation to broader social roles, and engagement with society. With this distinction in mind, we would argue that coming to terms with enchronic frame phenomena provides the basis for a more radical view. Specifically, the reflexive and accountable nature of co-present communication means that each and every communicative act reflects and reproduces the social world relevant for the parties involved. So, what might be conceived as discrete, communicative tasks, and aligned with Activity (e.g. successfully using a communication device, failing to repair a communication problem) are, at the same time, indicating the social identities, activities, roles, etc. that are locally implicated in the communicative interaction, i.e. Participation (and Personal and Environmental Factors). For example, when a person is selected as next speaker in conversation, but is not prompt with beginning their turn, this is simultaneously understood as a deviation from a generic expectation for how communication should transpire, and as indexing some particular meaning relevant for that interaction, and tied to the identities and roles of the people communicating (cf. Stivers & Robinson, 2006), e.g. as signifying that person *has* aphasia, and is experiencing word-finding difficulties. Seen this way, a number of the contorted

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distinctions between Activity and Participation dissolve, and give way to a perspective where *the technical accomplishment of communication is always tied to the social activities and roles of the parties involved in the communication situation* (see Enfield, 2013). So, in summary, embracing enchrony can provide a starting point for more systematically conceptualising and measuring the effects of communication disorders on everyday life.

PART 3: CO-PRESENT COMMUNICATION AND SP: AN AGENDA FOR RESEARCH AND PRACTICE

The arguments we have advanced in this critical review are ultimately aimed at encouraging SPs and researchers to get closer to the real time accomplishment of co-present communication.[5] We can envisage a number of tangible benefits to doing so. At the broadest level, serious engagement with the properties of co-present communication can facilitate progress towards addressing long-standing conceptual gaps and terminological inconsistencies in SP (see Speech Pathology Australia, 2008; Izaryk and Skaris-Doyle, 2017; Walsh, 2011). The utility of overarching frameworks is that they encourage coherency within and between disciplines. The biopsychosocial health perspective offered by the ICF, for example, is unquestionably valuable, but speech, language, and—as we have demonstrated—communication must be understood on (and in) their own terms (cf. Krummheuer et al., 2016; Rasmussen, 2016). As a slight segue, some readers may have registered the sparing use of the term *communication disability* throughout the review. We hope that our rationale for this choice will now be quite clear: it difficult to use *communication disability* precisely in the absence of a rigorous conception of communication. As we

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[5] The properties we have specified are suggestive of theories and measurement practices that are relevant for enchrony. Although we cannot detail them here, interested readers should consult, for example, Enfield (2013), Barnes and Ferguson (2013), and Higginbotham and Engelke (2013).

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have outlined, one might approach communication microgenetically, synchronically, enchronically, or through another lens altogether (e.g. via a longitudinal, experience-oriented perspective). So, we suggest that an explicit framework for communication disability must be developed, and it must be developed with simultaneous reference to models of cognition, language, communication, health, and disability.[6] Such a framework is likely to have substantial benefits for the conceptual and practical footing of SP practice. For instance, there have been various initiatives to explore and standardise sets of outcome measures for SP practice (on aphasia see, e.g. Wallace et al., 2017; Xiong et al., 2011). This has patent practical appeal, especially in the context of generating opportunities to measure the positive effects of SP interventions and services. But in the absence of a framework that accurately captures and classifies the relevant phenomena—particularly, language and communication—it risks consistently reproducing measurement errors and artefacts (cf. Horton, Clark, Barton, Lane, & Pomeroy, 2016, p. 6). That is, consensus outcome sets make little sense if the models underpinning them and their measures *both* misconstrue the phenomena they purport to address (cf. Armstrong, in press). A framework for communication disability along the lines that we have proposed here has much potential for underpinning the development of specific, communication outcome sets that span the scope of SP practice with communication.[7] With regard to the enchronic frame, repair organisation would seem a prime candidate for a standard outcome measure across different types of communication disorders (see, e.g. Lind, 2013).

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[6] Walsh (2011) and Hartley and Wirz (2002) offer models of communication disability, but they remain removed from the properties of communication, and retain the underlying semantics of the ICF.

[7] The contrast here is with more generic outcome sets / procedures that span the SP scope of practice, such as the AusTOMs (Perry & Skeat, 2004).

Coming to terms with communication disorders as enchronic frame phenomena should also be a priority for researchers. First, people live their lives through interactions with others. Describing the enchronic realisation of communication disorders will provide tangible information about the societal experiences of people with communication disorders. This has been of increasing interest for SP (see, e.g. Davidson et al., 2003; Parr, 2007), but has been largely approached through post-hoc reflection and field observation. An authentically enchronic perspective is valuable because it is stringently empirical, and because it treats communicative behaviour and its social consequences as inseparable. Second, empirical research focused on the fine details of communicative behaviours is required for developing novel SP assessment and intervention strategies (see, e.g. Beeke et al., 2015; Bloch & Tuomainen, 2017; Herbert, Best, Hickin, Howard, & Osborne, 2013). This will support the number and validity of clinical resources conventionally related to the Activity component of the ICF, which is a priority for many stakeholders in SP services (e.g. Wallace et al., 2017). However, it also raises the question of which language and communication measures and behaviours should be prioritised. With similar motivations, Worrall and Hickson (2008) suggested that assessment of Activity—specifically, conversation—could be facilitated through the design of "standardised environments" for measurement. As we argued above, this reflects the individually-oriented perspective underpinning the communication-related items in the ICF, and, arguably, the dominance of experimental design in empirical studies of communication disorders. Instead, and building on our arguments in the preceding paragraph, we would suggest that measurement of co-present communication would be better served by focusing on *standard phenomena*; minimally, the interactional systems for organising turn-taking, sequences, and repair. These interactional systems—or "organisations of practice" (Schegloff,

2006)—are pervasively relevant for co-present communication, have robust measurable units that are amenable to empirical, observational research, and there is a large body of evidence on their organisation for typical interactions (cf. Dingemanse, Blythe, & Dirksmeyer, 2014; Levinson, 2016; Schegloff, 2006; Stivers et al., 2009). Third, and finally, research on communication disorders and organisations of practice has much potential for specifying the nature of communication disorders, and supporting the clinical task of diagnosis. Exploring the relationship between speech, language, and communication behaviours and organisations of practice can assist with delineating how communicative pressures influence the manifestation of communication disorders (e.g. Beeke et al., 2007; Wilkinson, 2013). Alongside other methods of measurement and elicitation (e.g. testing, experimentation), this is likely to spur new hypotheses about the microgenetic and synchronic character of impairments to speech, language, and cognition. In addition, it will provide a basis for determining how different disorder types uniquely affect communication. This is not diagnostic in the sense of specifying disruptions to processing or representation; rather, understanding disorder-specific effects on turn-taking, sequence organisation, and repair organisation may be useful for determining the nature and severity of disorder-specific communication restrictions, and hence differential diagnosis (cf. Prutting & Kirchner, 1987, p. 115). Doing so would elaborate phenomena that are already part of the diagnostic criteria for conditions like developmental language disorder (Bishop, Snowling, Thompson, Greenhalgh, & The Catalise Consortium, 2017) and cognitive-communication disorder (Togher et al., 2014), for instance. The terms now used as descriptors for communicative aspects of the conditions are often conceptually muddled in a way that is unhelpful for the diagnostic process. For example, terms like "functional impairment" (Bishop et al., 2017, p. 1070) and the more pervasively used

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"communication impairment" span and cofound categories of phenomena in ways that are practically and conceptually unhelpful. An enchronic perspective directed towards organisations of practice can help ground the sense of these terms and their concepts as they relate to co-present communicative interaction, and support the development of more targeted and coherent diagnostic criteria for communication disorders (cf. Bishop, 2017, p. 676-677).

A final, perhaps more difficult challenge is building conceptual and technical change into everyday SP practice. That is, in order for rigorous, empirical measurement of real time co-present communication to become a routine part of practice, clinicians must be equipped with conceptual frameworks and technical skills relevant for this task. We are optimistic on this front; clinicians recognise the importance of co-present communication, and typically have good intuitions for it (e.g. Collis & Bloch, 2012; Hawksley, Buttimer, Ludlow, & Bloch, 2017). We would argue that the onus for changes rests with professional bodies, researchers, and SP educators to develop the empirical evidence and professional infrastructure required to ensure that theories of communication are truly on an equal footing with models of health and disability.

CONCLUSION

Speech pathologists and researchers should embrace the challenges associated with capturing co-present communication. In order to do this effectively, they require frameworks, concepts, and methods that can provide access to these phenomena. We have suggested Enfield's (2014) distinction between microgenetic, synchronic, and enchronic frames as a useful conceptual starting point, and offered properties of co-present communication to which SP frameworks, theories, research methods, and assessment and intervention strategies should be answerable. Empirical studies of

communication disorders and turn-taking, sequence organisation, and repair organisation are likely to be an engine for change, as are sustained efforts to reconcile the various conceptual frameworks that are relevant for SP practice and research. Failing to grapple with these issues will keep the reality of co-present communication at arm's length from SP practice; prioritised in word, but not in deed.

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Table I. Summary glosses of the properties of co-present communication

Property	Summary gloss
Dynamic	Communication occurs quickly; tenths of seconds are consequential.
Public and multimodal	People demonstrate their communicative objectives to each other via multiple, coordinated modalities.
Reflexive and accountable	People continuously make sense of each other using their expectations for the communication situation.
Local and collaborative	Each communication situation is uniquely configured, and people mutually create it.

```
                                    Image 1
1    A    lemon j[uice;°  ]=>so just a lit[tle (y' only]=
2    C           [°okay_° ]                [.hhh       ]
3    A    =need)< a [tiny b]it'v that.
4    C              [hh    ]
5         (.)
6    C    yup, HH
7         (0.6)                          Image 2
8    B    H .hh (.) [(carli) ↑w]ould you ↓pass me the=
9    C              [(you sh-) ]
10   B    =[water,]
11   C    =[i  cer]t'nly will.
12        (0.3)            Image 3
13   C    [.HH (there y'] *go;*)
14   B    [thank you;   ]
15        [(2.3)
         [((C sets down water jug next to B))
```

Figure 1. Bill asks Carli to pass him the water jug: Transcript and screenshots.
Notes: Images 1-3 correspond with the transcript text immediately below their labels on the transcript; see Barnes and Ferguson (2013) for transcription conventions.