RUNNING HEAD: COGNITION

What is Cognition?

A Functional-Cognitive Perspective

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It is fair to say that the concepts “cognition” and “cognitive” are pivotal in modern day psychology and that is no less true in empirical clinical psychology. To illustrate, a search on ISI Web of Science that was performed on September 19nd 2016 generated 468,850 hits when using “cognition OR cognitive” as a search term. As a (less than perfect but not trivial) comparison, consider the fact that the search term “emotion OR emotional” generated less than half that number of hits (209,087). A similar ratio was found when limiting these searches to articles dealing with clinical psychology or psychotherapy.

Despite its pivotal role, it is often not entirely clear what “cognition” (and thus “cognitive” as involving cognition) exactly means. In the first two sections of this chapter, we discuss two different perspectives on the nature of cognition. First, within cognitive psychology, cognition is typically defined in terms of information processing. Second, within functional psychology, cognition is conceptualized in terms of behavior. We then point out that both perspectives are not mutually exclusive. More specifically, they can be reconciled within a functional-cognitive framework for psychological research that recognizes two inter-dependent levels of explanation in psychology: a functional level that aims to explain behavior in terms of elements in the environment and a cognitive level that is directed at understanding the mental mechanisms by which elements in the environment influence behavior. We end the chapter by highlighting some of the implications of this functional-cognitive perspective on cognition for evidence-based psychotherapy.

Cognition as Information Processing

Although the term *cognition* has a long history dating back to the ancient Greeks (see Chaney, 2013, for a review), one of the currently most influential definitions was provided about 50 years ago by Neisser in his seminal textbook on cognitive psychology:

> *As used here, the term 'cognition' refers to all the processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used. It is concerned with these processes even when they operate in the absence of relevant stimulation, as in images and hallucinations ... Given such a sweeping definition, it is apparent that cognition is involved in everything a human being might possibly do; that every psychological phenomenon is a cognitive phenomenon. (Neisser, 1967, p. 4)*
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> *The task of a psychologist trying to understand human cognition is analogous to that of a man trying to discover how a computer has been programmed. In particular, if the program seems to store and reuse information, he would like to know by what 'routines' or 'procedures' this is done. (Neisser, 1967, p. 6)*

Despite the fact that few contemporary cognitive psychologists still adhere to the idea of serial computers as a model for the mind, three aspects of Neisser's definition have remained influential. First and foremost, Neisser (1967) views cognition as information processing. This is a mental perspective in so far as the mind is considered to be informational in nature. As noted by Gardner (1987, p. 383), linking cognition and the mind to information carves out a new level of explanation at which cognitive psychologists can operate. To fully appreciate the importance of this idea, one has to realize that information can be conceived of as nonphysical in nature. Wiener (1961, p. 132), one of the founders of information theories, put it as follows: "Information is information, not matter or energy". The assumption that information is nonphysical fits with the idea that the same piece of information (i.e., the same content) can in principle be instantiated in entirely different physical substrates (i.e., different vehicles such as desktop computers, magnetic tapes, brains; see Bechtel, 2008, for an insightful discussion of the distinction between the content and vehicles of information).

Consider the growth rings of a tree. These rings carry information about the climate during the years that the tree grew but that same information can also be captured by glacier ice layers or meteorological records. Moreover, the physical tree is only a vehicle for this content, it is not the content itself. This becomes apparent from the fact that growth rings reveal their content about climate only to entities that can read out this information (e.g., a climate scientist who, by combining observations of growth rings with her knowledge about the effects of climate on tree growth, can extract information about climate from the size of the growth rings). Importantly, because of the nonphysical nature of information, the study of information content can never be reduced to a mere study of the physical information vehicles. Hence, cognitive psychology as the study of information content in humans can never be reduced to a study of the physical brain, nor to a study of the whole organism (but see Bechtel, 2008, for the idea that at a very detailed level of analysis, there might be a unique overlap between content and vehicle and thus the potential to understand content by understanding the vehicle). In sum, Neisser's definition of cognition as information processing legitimized cognitive psychology as a separate science of the mental world (also see Brysbaert & Rastle, 2013, for an excellent discussion).

A second interesting feature of Neisser's (1967) definition is that it very much focusses on cognition as a dynamic process. This dynamic process can be described as a mental mechanism, that is, a chain of information processing steps (Bechtel, 2008). Cognition is thus akin to a physical mechanism that consists of parts and operations in which one part operates on another part (e.g., one cogwheel puts in motion another cogwheel and so forth). The main difference is that the parts and operations in mental mechanisms are informational in nature rather than physical. Because of their informational nature, these mental mechanisms are assumed to allow organisms to add meaning to the physical world. Like

physical mechanisms, cognition involves contiguous causation, that is, mental states that operate on each other. Put simply, one step in the mechanism (e.g., a mental state) is caused by an immediately preceding step (e.g., another mental state) that puts in motion the next step. [1]

The fundamental assumption of contiguous causation becomes apparent in how cognitive psychologists deal with the phenomenon of latent learning, that is, the impact of experiences at Time 1 (e.g., a rat exploring a maze with no food in it; a person experiencing a traumatic event) on behavior during a later Time 2 (e.g., the speed of locating food when it is afterwards placed in the same maze; panic attacks that occur days, weeks, or years after the traumatic event; Tolman & Honzik, 1930; see Chiesa, 1992, and De Houwer, Barnes-Holmes, & Moors, 2013, for a related discussion of latent learning). For cognitive psychologists, the change in behavior at Time 2 must be due to information that is present at Time 2 simply because there is an assumption that each thought and behavior needs a contiguous cause, that is, something here and now that causes the thoughts and behaviors at that time. This contiguous cause cannot be the experience with the maze at Time 1 because this event has already passed at Time 2 when the behavior is observed. If one accepts the basic assumption that mental mechanisms necessarily drive behavior, then the only possible explanation for latent learning is that (a) the original experience at Time 1 produced some kind of mental representation at Time 1, (b) this representation was retained in memory until Time 2, and (c) it functioned as a contiguous cause of the thoughts and behaviors at Time 2. Hence, from a cognitive perspective (i.e., based on the assumption that all behavior is driven

1 Note that we have simplified our description of mental mechanisms for presentational purposes. First, the metaphor of cogwheels suggest a strictly linear mechanism whereas mental mechanisms can operate also in a parallel or recursive manner. Second, in principle, it is possible that mental states arise spontaneously, that is, without being caused on a contiguous manner (although it would be difficult to demonstrate that a mental state is not caused by environmental input or other mental states). However, all mechanisms have in common that they consist of parts that operate on each other, even when those mechanisms operate in a parallel or recursive manner and even if the state of some parts can sometimes also change spontaneously.

by mental mechanisms), latent learning can be said to demonstrate the existence of mental representations in memory.

A third important feature of Neisser's (1967) definition is that it does not refer to consciousness. Hence, the definition is compatible with the idea that mental mechanisms can operate not only consciously but also unconsciously. In a sense, cognitive psychologists must accept a role for unconscious cognition if they want to maintain the assumption that "cognition is involved in everything a human being might possibly do" (Neisser, 1967, p. 4). Often, people seem completely unaware of what is driving their behavior. Cognitive psychologists can attribute such behaviors to the operation of unconscious cognition, that is, to information processing that is inaccessible to conscious introspection. In fact, it has been argued that in most situations in daily life, unconscious rather than conscious cognition drives human behavior, a claim that is often illustrated with the picture of an iceberg that is situated mostly under water (e.g., Bargh, 2014).

Of course, Neisser's definition is not the only definition of cognition within the cognitive psychology literature, nor has it gone uncontested (see Moors, 2007, for an excellent analysis of the various definitions that have been put forward in that literature). Some researchers specified criteria that single out some instances of information processing as "true" instances of cognition (e.g., criteria regarding the type of representations on which information processes operate or regarding the output of the processes; see Moors, 2007). Other cognitive psychologists use the term cognition also to refer to a subset of mental states. For instance, when contrasting cognition and emotion, cognitive researchers sometimes imply that cognitive states are non-emotional in that they involve "cold" beliefs rather than "hot" emotional experiences. Still others even exclude all phenomenological, conscious experience from the realm of cognitive states (see Moors, 2007). Finally, whereas Neisser's reference to

cognition as the operation of a computer program implies disembodied serial information processing, others proposed that humans process information in a parallel manner using sub-symbolic representations (e.g., McClelland & Rumelhart, 1985) or in ways that are closely tied into the biological nature of the human body (i.e., "embodied"; e.g., Barsalou, 2008). Despite these important differences in opinion, most if not all cognitive psychologists retained both the *assumption* that humans (and nonhuman animals) process information and the *goal* to try to uncover how humans process information. Hence, we can safely conclude that, from the perspective of cognitive psychology, information processing lies at the heart of cognition. Cognitive work in psychotherapy is often not formally based on specific theories in cognitive science, but most of these perspectives retain an information processing focus as specific types of schemas, core beliefs, irrational cognitions, and the list are examined.

A Functional-Analytic Approach to Human Language and Cognition

During the past fifty years, cognitive psychology has been so dominant that many psychologists will be surprised to discover that one can also think of cognition in a way that does not involve information processing. This is particularly important for the current volume, because some of the psychotherapy work in acceptance and mindfulness is based on a functional-analytic approach that adopts a non-informational perspective on language and thinking. This approach describes relations between environment and behavior in a way that serve to predict-and-influence behavior (see Chiesa 1994; Hayes & Brownstein, 1986). We are not arguing that the functional approach is inherently better or superior to the traditional or "mainstream" approach, rather that psychology, and clinical psychology in particular, should not be presented with an "either-or" choice in this regard.

A Functional-Analytic Approach

A functional approach to cognition begins with a functional-contextual orientation to

behavior (see the section on functional contextualism in Chapter 2, or Zettle, Hayes, Barnes-Holmes, & Biglan, 2016, for a recent book-length treatment). In a functional-contextual approach, functional relations can be "spread out" between and among events across both time and space. Let us return to the example of latent learning. For a functional psychologist, it suffices to say that a change in behavior at Time 2 is a function of an experience at Time 1. While what Skinner called "the physiologist of the future" (1974, p. 236) may one day provide additional information about that gap, the concept of the functional relation itself is in no way incomplete merely because it is spread out across time and space. For functional contextualists, descriptions of this kind are considered adequate because they generate scientific verbal analyses that permit basic and applied researchers, and practitioners, to predict and influence the behavior of individuals and groups.

The functional approach extends well beyond a brute form of empiricism, without collapsing into a collection of techniques for behavioral change, by holding fast to analyses with precision, scope, and depth as scientific goals (Hayes, Barnes-Holmes, & Roche, 2001; see also Chapters 2 and 6). *Precision* requires that behavior analysis seeks to identify or generate a limited or parsimonious set of principles and theories of behavioral change. *Scope* requires that these principles and theories should apply across a wide range of behaviors or psychological events. And *depth* requires that such scientific analyses should not contradict or disagree with well-established scientific evidence and analyses in other scientific domains (e.g., a behavioral "fact" should be broadly consistent with facts established in neuroscience or anthropology).

A classic example of a functional analytic concept is the three-term contingency (described in the previous chapter) that defines operant behavior (or the four-term contingency, if motivational factors are added). Nothing in the concept of an operant requires

immediate contiguity – the focus is on the functional relation among classes of events.

Stimulus Equivalence and Relational Frame Theory: A Functional-Analytic Approach to Human Language and Cognition

The concept of the operant has provided a core scientific unit of analysis in the development of an account of human language and cognition, known as Relational Frame Theory (RFT; Hayes et al., 2001; see Hughes and Barnes-Holmes, 2016a, 2016b for recent reviews). This theory emerged originally from a program of research devoted to the phenomenon of stimulus equivalence (see Sidman, 1994, for a book-length treatment). The basic effect is defined as the emergence of unreinforced or untrained matching responses based on a small set of trained responses. For example, when a person is trained to match two abstract stimuli to a third (e.g., select Paf in the presence of Zid and select Vek in the presence of Zid), untrained matching responses frequently appear in the absence of additional learning (e.g., select Vek in the presence of Paf and Paf in the presence of Vek). When such a pattern of unreinforced responses occurs, the stimuli are said to form an equivalence class or relation. Importantly, this behavioral effect, according to Sidman, appeared to provide a functional-analytic approach to symbolic meaning or reference.

Initially, the stimulus equivalence effect appeared to challenge a functional explanation, based on operant contingencies, because whole sets of matching responses emerged in the absence of programmed reinforcers (e.g., selecting Paf in the presence of Vek without ever reinforcing this behavior). Indeed, the emergence of such untrained responses provided the critical defining property of the stimulus equivalence effect itself. However, RFT posited that stimulus equivalence was just one overarching or generalized operant class of arbitrarily applicable relational responding (AARR). According to this view, exposure to an extended history of relevant reinforced exemplars served to establish particular patterns of

overarching or generalized relational response classes, defined as relational frames (Barnes-Holmes & Barnes-Holmes, 2000).

For example, a young child would likely be exposed to direct contingencies of reinforcement by the verbal community for pointing to the family dog upon hearing the word dog or the specific dog's name (e.g., "Rover"), and to emit other appropriate naming responses, such as saying "Rover" or "dog" when the family pet was observed, or saying "Rover" when asked, "What is the dog's name?" Across many such exemplars, involving other stimuli and contexts, eventually the operant class of coordinating stimuli in this way would become abstracted, such that direct reinforcement for all of the individual components of naming would no longer be required when a novel stimulus was encountered. Imagine, for example, that the child was shown a picture of an aardvark, and the written word, and was told its name. Subsequently, the child may say "That's an aardvark" when presented with a relevant picture or the word without any prompting or direct reinforcement for doing so. In this way, the generalized relational response of coordinating pictorial, spoken stimuli, and written words would be established, and directly reinforcing a subset of the relating behaviors "spontaneously" generates the complete set. More informally, as the result of many experiences of being rewarded for responding as if sets of stimuli are equivalent in certain ways, children acquire the capacity to respond as if other sets of stimuli are equivalent without being rewarded for doing so. Generalized relational responding thus refers to classes of responses that are applied to novel sets of stimuli. Critically, once this pattern of relational responding has been established, it occurs in ways that are sensitive to specific contextual cues. Contextual cues can thus be seen as functioning as discriminative for particular patterns of relational responding. The cues acquire their functions through the types of histories described above. Thus, for example, the phrase "that is a", as in "*That is a* dog" would be

established across exemplars as a contextual cue for the complete pattern of relational responding (e.g., coordinating the word “dog” with actual dogs). Once the relational functions of such contextual cues were established in the behavioral repertoire of a young child, the number of stimuli that may enter into such relational response classes becomes almost infinite (Hayes & Hayes, 1989; Hayes et al., 2001).

The core analytic concept of the relational frame proposed by RFT provided a relatively precise technical definition of AARR. Specifically, a relational frame was defined as possessing three properties; mutual entailment (if A is related to B then B is also related to A), combinatorial mutual entailment (if A is related to B and B is related to C, then A is related to C, and C is related to A), and the transformation of functions (the functions of the related stimuli are changed or transformed based upon the types of relations into which those stimuli enter). Imagine, for example, that you are told that “Guff” is a really tasty new brand of beer, and that you will love it, but you are also told that another new brand is called “Geedy”, and it is the complete opposite in terms of taste. It is likely that given a choice between the two beers you will chose the former over the latter, in part because the two verbal stimuli, “Guff” and “Geedy”, have entered into a relational frame of opposition and the functions of Geedy have been transformed based on its relationship to Guff (more informally, you respond as if you expect Geedy to have an unpleasant taste).

Much of the early research in RFT was designed to test its basic assumptions and core ideas. Some of this work showed that relational framing as a process occurs in several distinct patterns. These patterns of responding, referred to as relational frames (e.g., coordination, opposition, distinction, comparison, spatial frames, temporal frames, deictic relations, and hierarchical relations), were demonstrated across numerous experimental studies (see Hughes & Barnes-Holmes, 2016a, for a recent review), and some of the research also reported

reliable demonstrations of the property of the transformation of functions (e.g., Dymond & Barnes, 1995). In addition, research showed that relational framing could be observed using a variety of procedures (e.g., Barnes, Smeets, & Leader, 1996), indicating that the phenomenon was not tied to a particular experimental preparation or modes of instruction, provided the key functional elements were present. Studies showed that exposure to multiple-exemplars during early language development is required to establish specific relational frames (e.g., Barnes-Holmes, Barnes-Holmes, Roche, & Friman, 2004; Lipkens, Hayes, & Hayes, 1993; Luciano, Becerra, & Valverde, 2007), which supported the idea that relational framing was a generalized operant (see Barnes-Holmes & Barnes-Holmes, 2000; Healy, Barnes-Holmes, & Smeets, 2000).

Relational framing provides a functional-analytic account of many of the specific domains within human language and cognition (Hayes et al., 2001; see Hughes & Barnes-Holmes, 2016b, for a recent review). For illustrative purposes, we will briefly consider three of them to show how cognitive phenomena can be addressed in purely functional-analytical terms without reference to a mental world of information processing.

Rules as relational networks. According to RFT, understanding and following verbal rules or instructions is a result of frames of coordination and temporal relations that contain contextual cues and that transform specific behavioral functions. Consider the simple instruction, “If the light is green, then go.” It involves frames of coordination among the words “light”, “green” and “go” and the actual events to which they refer. In addition, the words “if” and “then” serve as contextual cues for establishing a temporal or contingency relation between the actual light and the act of actually going (i.e., first light then go). And the relational network as a whole involves a transformation of the functions of the light itself, such that it now controls the act of “going” whenever an individual who has been presented

with the rule observes the light being switched on. Although the foregoing example is a relatively simple one, the basic concept may be elaborated to provide a functional-analytic treatment of increasingly complex rules and instructions (e.g., O'Hora, Barnes-Holmes, Roche, & Smeets, 2004; O'Hora, Barnes-Holmes, & Stewart, 2014).

Analogical reasoning as relating relational frames. Another example is analogical reasoning (e.g., Stewart, Barnes-Holmes, Hayes, & Lipkens, 2001) which is viewed as the act of relating relations themselves. Suppose participants are trained and tested for the formation of four separate frames of coordination (the actual stimuli may be graphical squiggles or anything else, but labeling using alphanumerics helps keep the example clear: A1-B1-C1; A2-B2-C2; A3-B3-C3; A4-B4-C4). The critical test involves determining if participants will match pairs of stimuli to other pairs of stimuli in a manner that is consistent with the relations between the stimulus pairs. For example, if the stimulus pair B1-C1 is presented with two choices, B3-C3 and B3-C4, the correct choice would be B3-C3, because both stimulus pairs (B1-C1 and B3-C3) are in frames of coordination, whereas the B3-C4 pair is not (Barnes, Hegarty, & Smeets, 1997). This basic RFT model of analogical reasoning generated an entire program of research with adults and children (see Stewart & Barnes-Holmes, 2004, for a summary) that uncovered important facts in the development and use of analogy and metaphor.

Implicit cognition and brief and immediate relational responding. RFT researchers have developed ways to distinguish brief and immediate relational responses (BIRRs), which are emitted relatively quickly within a short window of time after the onset of some relevant stimuli, from extended and elaborated relational responses (EERRs) that occur over a longer period of time (Barnes-Holmes, Barnes-Holmes, Stewart, & Boles, 2010; Hughes, Barnes-Holmes, & Vahey, 2012). The distinction between BIRRs and EERRs has

been formalized by the Relational Elaboration and Coherence (REC) model, which provided an initial RFT approach to implicit cognition (Barnes-Holmes et al., 2010; Hughes, Barnes-Holmes, & Vahey, 2012) and the Implicit Relational Assessment Procedure (IRAP) was developed (Barnes-Holmes et al., 2010) to assess this domain. The IRAP has proven to be a useful clinical tool: for example, predicting individual failure in cocaine treatment programs (Carpenter, Martinez, Vadhan, Barnes-Holmes, & Nunes, 2012).

Conclusion

At this point, it should be clear that it is indeed possible to conduct research in the broad domain of human language and cognition using either a mechanistic mental model or a functional model. Researchers interested in mentalistic models and theories will likely be dissatisfied with a functional-analytic explanation and vice versa, due to the different sets of philosophical assumptions and scientific goals that characterize each approach to psychological science (see Chapter 2). Nonetheless, we will briefly argue in the next section that these two broad approaches do not have to be considered as antagonistic or mutually exclusive.

The Functional-Cognitive Framework

De Houwer (2011; see Hughes, De Houwer, & Perugini, 2016, for an update) argued that the functional and cognitive approaches in psychology can be situated at two separate levels of explanation. Whereas functional psychology focuses on explanations of behavior in terms of its dynamic interaction with the environment, cognitive psychology aims to explain environment-behavior relations in terms of mental mechanisms. Consider the example of a client who exhibits fear of elevators (also see De Houwer, Barnes-Holmes, & Barnes-Holmes, 2016). At a functional level, one could explain this fear by arguing that it originated from a panic attack that occurred in an elevator or in another context that was related to

elevators via arbitrarily applicable relational responding. Fearful responding to elevators is thus explained as being a consequence of a particular environmental event. Cognitive psychologists, on the other hand, would want to know *how* such an event can lead to fear of elevators. They might argue that the event resulted in the formation of associations between representations in memory (e.g., between the representation for “elevator” and “panic”) or the formation of propositional beliefs about elevators (e.g., “I will suffocate when I am in an elevator”) and that those associations or propositions then lead to fear of elevators under certain conditions.

Importantly, because the explanations that are developed in functional and cognitive psychology are fundamentally different, there is no inherent conflict between the two approaches. The explanations offered by functional and cognitive psychologists address different types of questions, and as long as each approach remains firmly committed to its respective level of explanation, functional and cognitive psychologists can collaborate to their mutual benefit.

On the one hand, cognitive psychology can benefit from the conceptual, theoretical, and empirical knowledge that functional psychologists have gathered about the ways in which the environment influences behavior (including the behavior of framing events relationally): the more we know about environment-behavior relations, the better able we are to constrain cognitive theories about the mental mechanisms by which the environment influences behavior. Vice versa, knowledge generated by cognitive research can help functional researchers to identify environment-behavior relations.

Neither is necessarily superior to the other. Ultimately, choosing one of the two approaches shows a preference for a particular type of explanation. Functional psychologists focus on functional (i.e., environment-behavior) explanations because this allows them to

predict-and-influence behavior. Cognitive researchers, however, want to know the mental mechanisms that drive behavior and will therefore not be satisfied with "explanations" that specify only environment-behavior relations. There is little point in arguing about which type of explanation is superior because the answer to this question depends on fundamental philosophical assumptions and aims. Rather than devoting energy to such unresolvable debates, we see more merit in accepting that different researchers can pursue different types of explanation while still learning from each other (see Hughes et al., 2016, for an overview of the strengths and challenges of this functional-cognitive framework for psychological research).

The functional-cognitive framework allows for a reconciliation of cognitive and functional perspectives on cognition – not by one collapsing into the other but by a recognition of the different issues they address. From a functional-analytic perspective, cognition is behavior (also see Overskeid, 2008). Phenomena that are typically considered to be cognitive (e.g., reasoning, implicit cognition) are seen as patterns of responses that are the result of historical and situational events. From the perspective of cognitive psychology, cognition is a form of information processing that mediates such phenomena. For instance, from a cognitive perspective, the ability to reason arises because a multitude of learning events lead to mental representations and information processing skills that allow one to act as if sets of stimuli are equivalent in certain ways. Likewise, the environment may be seen as shaping up mental representations and information processing skills that allow one to relate relations (analogical reasoning) and display BIRRs (implicit cognition). A synergy between functional and cognitive perspectives requires only that cognitive psychologists conceive of cognitive phenomena as (complex) environment-behavior relations that are mediated by (complex) information processing (see Liefooghe & De Houwer, 2016, for an example in the

context of cognitive control phenomena). Once cognitive phenomena are approached from a functional-analytic level of explanation, and clearly separated from the mental mechanisms that mediate them, a fruitful collaboration can be initiated between functional and cognitive approaches to cognition. On the one hand, functional researchers can then start benefitting from the enormous wealth of empirical findings and theoretical ideas about cognitive phenomena that have been and continue to be generated within cognitive psychology. On the other hand, cognitive psychologists can exploit the concepts, theories, and findings about cognitive phenomena that have been accumulated in functional psychology. In the final section of this paper, we discuss some implications of this functional-cognitive framework for clinical psychology.

Implications for Clinical Psychology

Although clinical psychology, as both an applied and academic endeavor, places mental events at its very core, the concept of cognition is still somewhat controversial. This is likely due, as noted above, to lack of clarity and consensus about how best to operationally define this broad umbrella term. This lack of clarity and consensus is evident in the antipathy that sometimes is felt between behavior therapy and cognitive therapy/cognitive behavior therapy (CBT). For some decades, clinical psychology has embodied this polarization and, for the most part, seems unable to structure itself any other way (De Houwer et al., 2016).

What the functional-cognitive framework seems to offer is clarity about which level of analysis and through which therapeutic means one is operating. The framework does not suggest one of these over the other, nor attempt to integrate them. It simply asks the clinician to identify which concepts and which therapeutic means best serve her conceptual analyses and her therapeutic aims, and appears to allow greater clarity in this endeavor than previously existed.

Below, we provide several extended examples so that the approach we are suggesting might be better understood. Wells and Matthews (1995) offer a theoretical explanation for a typical client who presents with an anxiety disorder, suggesting that the client focuses too much attention on particular stimuli, such as social cues including the facial expression of others. Critically, the concept of "attention" (or more precisely in this context, attentional bias) is considered to involve information processing in the traditional cognitive-psychological meaning of that term. Consequently in therapy, the client is instructed and encouraged to focus some of his attentional (mental) resources on his attending, with a view to recognizing that it is excessive when he could be attending to more relevant stimuli.

If the same client was undergoing a more-functionally oriented type of therapy, the therapist might ask him about the costs and/or benefits served by him attending to particular social cues, with a view to establishing a broader and more flexible behavioral repertoire in this regard. In this conceptualization, however, there is no appeal to attention as a mental event involving information processing. The language of "attending" is simply used to orient the client to how verbal rules and evaluations may be leading to patterns of broadening or narrowing stimulus control. In other words, the client is encouraged to engage in relational actions that transform the behavior-controlling properties of the facial stimuli of other people (e.g., "when other people look at me, I tend to think they're judging me, and this makes me uncomfortable, so I withdraw, but that leaves me isolated and that is inconsistent with what I value").

Within the context of the functional-cognitive framework, the Meta-Cognitive Therapy approach taken by Wells and colleagues, and a functional-analytic approach overlap in some important ways (e.g., the focus on the client's own attention to particular social cues). However, in the former case the theoretical analysis is driven heavily by an

information-processing view of attention, whereas in the latter case attention is defined as involving particular functional-analytic classes of derived relational responding. In our view, these two approaches to understanding and changing the client's behavior are not necessarily in direct opposition, but rather represent philosophically different ways of talking about broadly similar psychological events.

Let us consider a second classic example involving Beck's cognitive theory of depression and taken from Padesky (1994). Cognitive therapists devote considerable attention to schemas, especially those pertaining to affective states and behavioral patterns, as core beliefs that play a strong role in psychological suffering. In line with an information-processing approach, Beck proposed that "a schema is a structure for screening, coding, and evaluating … stimuli" (see Harvey, Hunt, & Schroder, 1961, p.283). Cognitive therapy focuses on simultaneously identifying and changing maladaptive core schemas, and building alternative adaptive ones (Beck et al., 1990). Consider the following example of a female client who identified the schema "The world is dangerous and violent", deemed maladaptive because it was accompanied by fear and depression. In observing events that activated this schema, the client and therapist clarified that greater affect accompanied the schema "Kindness is meaningless in the face of pain and violence". Working with the alternative schema" Kindness is as strong as violence and pain" helped the client to cope with the violent and painful realities she faced and to sustain hope and effort.

Consider now the same client undertaking functionally-oriented psychotherapy. The related thoughts and rules about the world as a violent place and about the futility of kindness would be explored as functionally-related response classes that controlled avoidance and led to further suffering. The emergence of these patterns would be contextualized within the client's history (e.g., she tried hard to please her parents, but they were never suitably

impressed). This would indicate the role of the history in accounting for why these psychological events have such strong control over current behavior, instead of values controlling behavior. Work on the deictic (perspective-taking) relations such as imagining what she would say to herself if she could talk to herself as small child would also serve to support the client as the owner of this history and the mental events it generates, so that she can choose what to do with her own behavior when these events emerge in certain contexts.

Again, in our view, these two approaches to understanding and changing the client's behavior are not in opposition to one another, but are simply philosophically different ways of talking about similar events. Once this is fully recognized, practitioners (and researchers) in both traditions can begin to have a meaningful and hopefully mutually beneficial dialogue about human cognition and how it may be changed. This very book is in part an example of such a dialogue.

Conclusion

In this chapter, we argued that cognition may be understood both functional-analytically as involving complex environment-behavior relations as well as in term of information processing that mediates those environment-behavior relations. We pointed out that these two perspectives are not mutually exclusive. On the contrary, within a functional-cognitive framework close interactions between functional and cognitive research could, in principle, lead to a better understanding of cognition in clinical psychology, whether it is defined in functional-analytical terms or in terms of information processing. This functional-cognitive framework thus provides a new perspective on the long standing divide between functional and cognitive approaches in clinical psychology, and psychology more generally, and opens up avenues for future interactions between researchers and practitioners from both sides of the divide.

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