The Role of the Individual in the Coming Era of Process-Based Therapy

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Abstract

For decades the development of evidence-based therapy has been based on experimental tests of protocols designed to impact psychiatric syndromes. As this paradigm weakens, a more process-based therapy approach is rising in its place, focused on how to best target and change core biopsychosocial processes in specific situations for given goals with given clients. This is an inherently more idiographic question than has normally been at issue in evidence-based therapy over the last few decades. In this article we explore methods of assessment and analysis that can integrate idiographic and nomothetic approaches in a process-based era.

The Role of the Individual in the Coming Era of Process-Based Therapy

Questioning assumptions in science is disruptive. Within a defined area of study, *a priori* analytic assumptions provide the scaffolding for which questions are asked, which methods are used, and which data are deemed relevant. Professionals often view questions, methods, and analytic units simply as the required tools of good science – not reflections of assumptions – and as a result there can be a sense of disorientation when times of upheaval arrive and assumptions are pointed out and critically examined.

So it is today within the domain of mental health, and the intervention science linked to it. For decades is has been assumed that a satisfactory field of evidence-based treatment could emerge based on adequate experimental tests of protocols focused on psychiatric syndromes. This *protocols for syndromes* era had a coherent set of key strategic assumptions built into its scientific and public health strategy – but every one of them is now being openly questioned. At the same time, a powerful alternative strategic agenda is emerging that echoes some of the process-based and idiographic assumptions of the earliest days of behavioral research, as well as the therapy based upon it. We are reminded of that history by the very name of this, the oldest of all of the applied behavioral journals. However, revitalization of the study of change processes that apply idiographically is not a mere repeat of the past, since it encompasses questions, methods, and data that are distinct and new (Hayes & Hofmann, 2017, 2018; Hofmann & Hayes, 2018).

Foundational Assumptions of the Protocols for Syndromes Era of Evidence-Based Therapy

With the advent of DSM-III in the late 1970s and the arrival of a syndrome-focused approach to applying for research funding, a set of key strategic assumptions gradually shaped the very definition of intervention science. They included:

1. Notable and treatable human biopsychosocial problems reflect latent diseases (i.e. mental illnesses). Mental health is synonymous with or at least is based on the absence of mental illness.
2. While we do not yet know how many mental illnesses there are, they form a discrete and discoverable set.
3. To discover them, a good strategy is to gather together signs (features we can see) and symptoms (features of complaints) into syndromes and sub-syndromes and to use these identified clusters to guide a search for their underlying etiology, course, response to treatment, and mechanisms of pathology and response.
4. Sets of techniques that target biopsychosocial problems should be forged into well-specified protocols that are tested in randomized controlled trials for their ability to change the signs and symptoms of known syndromes.
5. As evidence gathered, meta-analyses, organizational reviews, or state-sponsored examination systems would identify which named treatments are evidence-based, and over time, which ones are best for which syndrome.
6. Public health outcomes will improve when practitioners are made to use evidence-based treatments, competently and to adherence. Once such treatments are identified, they should be disseminated by all necessary means.
7. Component analyses and studies of processes of change ultimately need to be done, but only for established evidence-based treatments, with the purpose of rounding out our scientific understanding and providing clues about how to simplify our best protocols.

8. Regardless of why they occur, notable changes in established protocols such as adding or subtracting elements, creating online versions, changing dosage, should be re-validated experimentally (see step 4).

As a public relations matter, the idea of mental *illness* (assumptions 1 through 3 above) has spread across the globe. Worldwide, people across the kitchen table discuss what syndromes their acquaintances, loved ones, or public figures “have". The idea of evidence-based treatments is far less clear in the public eye (Carman et al., 2010). Commercial interests have ensured that classes of medications are well known (particularly in the United States where commercials for psychoactive medications are legal and common). To a much lesser degree, educated members of the public may know that some psychosocial treatment protocols are better supported empirically than others, but they often don’t understand what “empirically supported” means (Carman et al., 2010).

As a public health matter, it is hard to argue that this era has been a success. The health care burden of mental health problems is increasing (e.g., Larkin, Claassen, Emond, Pelletier, & Camargo, 2005). Treatment is becoming more medical, and chronic. In the ten-year period from 1998 to 2007, people using psychotherapy alone to address mental health issues fell nearly 50% and by 2007 only 1 in 10 people with mental health problems addressed them that way. Using psychotherapy *and* medications also fell about 30%. Meanwhile 60% of people use nothing but medications – up a third in ten years (Olfson & Marcus, 2010). Psychiatric polypharmacy is rising in vulnerable populations (Maust, Gerlach, Gibson, Kales, Blow, & Olfson, 2017). Thirteen percent of the United States population over 12 used anti-depressants during 2014, a 65% increase from 15 years earlier; and a quarter of those now on anti-depressants have used them for a decade or more (Pratt, Brody, & Gu, 2017).

As a scientific matter, there were enormous increases in data and information secured during the era of protocols for syndromes, but this period did not produce the outcomes it promised. For one thing, research on syndromes did not in fact yield identifiable diseases. Despite decades of pouring significant research dollars into a strategy that was supposed to reveal them, not even one good example exists of this occurring. Given the assumptions behind disease reasoning, it was disheartening that the full mapping of the human genome failed to lead to identifiable genes or gene systems that could explain psychopathology in a direct and robust fashion. For example, in a meta-analysis of the genetic basis of major depression based on genomic analysis of over 100,000 participants, the authors concluded they were "unable to identify robust and replicable findings" (Sullivan et al., 2013, p. 497). High levels of so-called "comorbidity" suggested that clusters of signs and symptoms were not linked to discrete functions (Kupfer, First, & Regier, 2002). When the DSM–5 was released it was to disinterest or controversy, not applause.

Meanwhile, on the intervention side, empirically validated protocols proliferated but overlapped, and rarely applied to specific syndromes. Instead, the protocols often lacked treatment specificity (Kupfer et al., 2002), and failed to identify the key components and processes of change. In the US, the NIMH launched a multi-year effort to back away from the assumption that syndromes should be the guiding focus of mental health research (Insel et al., 2010).

The latent disease model arguably has had other negative effects. It tended to blind treatment developers to the key role of normal psychological processes in behavioral outcomes, and to the centrality of pragmatic outcomes desired by consumers such as social effectiveness or quality of life, instead prioritizing the referred list of signs and symptoms. It tended to reduce

human suffering to brain abnormalities and biological dysfunctions and de-emphasize the centrality of the individual (Greenhalgh, Howick, & Maskrey, 2014) and with it the cultural and biopsychosocial context of individual human lives.

Meanwhile practitioners, government entities, and the public in many parts of the world remained unconvinced about the value of evidence-based care. Protocols were at times difficult to deploy, and the lack of known components and processes of change made them difficult to fit to individuals and their complexity. Most patients given psychosocial treatment did not receive evidence-based care (Wolitzky-Taylor, Zimmermann, Arch, De Guzman, & Lagomasino, 2015).

Success of the "protocols for syndromes" approach depended on rapid progress toward functional disease entities, or at lease highly specific treatment effects organized by syndromes. When neither appeared, the scientific path toward a mature form of evidence-based therapy turned into a kind of brute force empiricism in which almost everything should be compared to almost everything else in all syndromes or sub-syndromes. The mathematics of that kind of research approach makes it impossible to mount, even if the number of new intervention methods and syndromal or sub-syndromal entities could magically be held to its current number, which it cannot.

Process-Based Therapy

The earliest days of behavior therapy were characterized by an attempt to apply evidence-based principles of change through the use of functional analysis. That era fell away with the arrival of the DSM-III, but in truth it had severe difficulties of its own. Principles of change at the time were largely limited to direct contingency principles, which was too small of a set. In addition, applying principles to individual patterns of behavior was more an art than a science, making replicable assessment difficult (Hayes & Follette, 1992). Applied behavior analysis tried

to solve the replicability problem by limiting functional analysis to the empirical measurement of four types of direct contingencies (action maintained by escape/avoidance, attention, sensory stimulation, or tangible consequences), but once children began to derive symbolic relations that system no longer yielded clear results, in essence confirming that direct acting contingencies alone are insufficient to analyze human complexity once human cognition begins to dominate (Belisle, Stanley, & Dixon, 2017). In the modern era, however, a new and broader variant of that process-based vision is once again appearing. A good example is provided by the *Inter-Organizational Task Force on Cognitive and Behavioral Psychology Doctoral Education* organized by the *Association for Behavioral and Cognitive Therapies* (Klepac et al., 2012). This Task Force reached the conclusion that a key focus of training in cognitive behavior therapy (CBT) should be on the assumptions, principles, and competencies that underlie CBT intervention methods and that allow them to be applied to individuals.

We have argued that there is now enough evidence for a broad enough range of change processes that this core approach can be expanded to what we have termed ***Process-Based Cognitive Behavioral Therapy (PB-CBT)*** or ***Process-Based Therapy (PBT)*** for short (Hayes & Hofmann, 2018; Hofmann & Hayes, 2018). PBT is the contextually specific use of evidence-based therapeutic processes linked to evidence-based therapeutic procedures to help solve the problems and promote the prosperity of an individual. Indeed, the advent of PBT is consistent with recent initiatives to conceptualize treatment outcomes as a function of patient characteristics in addition to intervention specific effects (APA, 2006). We defined processes this way:

> *Therapeutic processes* are the underlying change mechanisms that lead to the attainment of a desirable treatment goal. We define a therapeutic process as a set of theory-based, dynamic, progressive, and multilevel changes that occur in predictable empirically

> established sequences oriented toward the desirable outcomes. These processes are *theory–based* and associated with falsifiable and testable predictions; they are *dynamic*, because processes may involve feedback loops and non-linear changes; they are *progressive* in the long-term in order to be able to reach the treatment goal, they form a *multilevel system*, because some processes supersede others. Finally, these processes are oriented toward both immediate and long-term goals. (Hofmann & Hayes, 2018, MS pp. 4-5)

Such a vision of evidence-based therapy alters Gordon Paul's classic "clinical question" for evidence-based therapy, which drove the earliest days of behavior therapy. Instead of *What treatment, by whom, is most effective for this individual with that specific problem, under which set of circumstances, and how does it come about?* (Paul, 1969; p. 44) PBT asks a more modern question: *"What core biopsychosocial processes should be targeted with this client given this goal in this situation, and how can they most efficiently and effectively be changed?"* (Hofmann & Hayes, 2018, MS page 4). This change in the key underlying question shifts attention away from identifying effective treatment for problem types, as moderated by demographic and circumstantial characteristics, to deploying effective treatment elements based on systems of therapeutic change processes as displayed by given people in given situations with given goals. For example, instead of finding the best treatment for depression in trauma survivors, the focus might shift to finding the best way to reduce social withdrawal and promote more meaningful and intimate relationships in a client who developed ruminative attentional rigidity and patterns of emotional avoidance following a physical attack.

In the present paper, we plan to address a hidden methodological problem that is laid bare by the re-examination of the core analytic assumptions of intervention science: the excessive

reliance on the collective or the group as the proper level of analysis, and the related emphasis on cross sectional over longitudinal data.

Individual human lives are contextual and longitudinal, as are the change processes that alter these life trajectories. From a process-based point of view, practitioners need coherent and broadly applicable models of change processes that are relevant for the individual in context, that provide increased treatment utility and intervention guidance, and that simplify human complexity. The most popular methodological and analytic tools in use in intervention science are not fully adequate to that task, even when they are turned in the direction of change processes.

There have been notable attempts to develop a flexible approach to translate general principles to individual applications. Persons' (2008) case-formulation approach to CBT has received considerable attention. Because many patients' presenting problems are not successfully resolved by the simple application of a single CBT protocol to a single disorder, Persons argues that individual differences must be emphasized in assessment, case formulation, and treatment planning, particularly when treating difficult presenting problems (e.g., multiple diagnoses, diagnoses for which no empirically supported treatment is available). Thus, a core responsibility of the therapist is to translate a nomothetic theory (e.g., Beck's cognitive theory of depression) into an idiographic application that enables an individual patient to benefit from psychotherapy (Persons, 2008). There have been attempts to evaluate this approach empirically (e.g., Persons, Beckner, & Tomkins, 2013), but further progress requires methods of addressing the next issue we will discuss (cf., Fisher, Medaglia, & Jeronimus, 2018).

The Domination of the Collective: The Example of Mediation and Moderation

Clusters of signs and symptoms are abstractions identified at the level of a collective. Clients with the same identified syndromes may experience quite different problems. Nevertheless, the logic of syndromal classification treats these individuals as part of a homogeneous group because they arguably share the same latent disease.

A focus on functionally important processes of change tied to specific treatment goals is far more idiographic and requires that we adjust our methodological and statistical approaches accordingly. A good example can be seen in the identification of mediators and moderators.

Baron and Kenny's (1986) article laid the foundation for generations of mediation and moderation analyses. Baron and Kenny defined a mediator as "the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest" (Baron & Kenny, 1986, p. 1173), and define a moderator as a "variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable" (Baron and Kenny, 1986; p. 1174). Full mediation is assumed to exist if the relationship between two variables A and C disappears when controlling for the mediator B (e.g., Baron & Kenny, 1986). Partial mediation exists if a variable A has both a direct effect on C and an indirect effect on C through B (James & Brett, 1984).

Mediators and moderators of change are typically studied by using analyses of variance, regression models, and structural equation models (Baron & Kenny, 1986; Holmbeck, 1997; Judd & Kenny, 1981). These procedures are supposed to test for the causal direction of the mediating effects (Smith, 1982), to differentiate full from partial mediation (Holmbeck, 1997; Sobel, 1982), and to test a combined mediation/moderation model (Baron & Kenny, 1986).

Since the publication of Baron and Kenny's (1986) seminal paper, a number of revisions and clarification for the testing of moderation and mediation (and moderated mediation) have

occurred (Holmbeck, 1997; Hayes & Preacher, 2014; Judd & Kenny, 1981; Kraemer, Wilson, Fairburn, & Agras, 2002; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). As statistical approaches for mediation have improved (Hayes, 2009; MacKinnon & Fairchild, 2009) and become more accessible, an increasing number of change processes have been identified.

However, as typically conducted, there are substantial limitations to such analyses for informing a process-based approach to CBT. Full and partial mediation apply to inferences about population parameters, but they are "not inference[s] that can be applied to the individuals in [a] study, nor can [they] be applied to people in general, nor can [they] be applied to the specific causes operating at the level of the individuals" (Grice, Cohn, Ramsey, & Chaney, 2015).

In classic models of mediation, temporal precedence of the mediator in relation to the outcome is consider key (Kraemer et al., 2002), and variables that appear to be significant mediators when change is tested concurrently often fail to show significance when temporal precedence is examined (e.g., Su, Carpenter, Zandberg, Simpson, & Foa, 2016). Mediational analyses always fall short of establishing strict causation, because of the possibility of an "unmeasured confounder" (Imai, Kelle, & Tingley, 2010; Pearl, 2012). Furthermore, requiring that a mediator be assessed before outcomes change "significantly" fails to consider or model the role of incremental change even if it is not yet "significant" leaving the researcher with a guessing game to know when mediators should be assessed in order to avoid the temporality problem.

This basic framework of mediation is highly problematic because it is built on incorrect assumptions. In many, if not most cases, mediators and outcomes are dynamically and bi-directionally linked. Classic meditational analyses provide no means to model the *degree to*

which mediators impact outcome and outcomes impact mediators. Feedback loops, bidirectional relationships, or setting factors that alter mediator-outcome relationship and themselves change after intervention begins, are all poorly suited to classic meditational methods.

The development of adequate models of change is not fully served by classic meditational methods because testing the specificity of the mediating variable by controlling for other plausible mediators is not commonly done, nor is comparing the strength of mediation across different interventions or treatment components to examine the specificity of a mediator to the treatment elements designed to target it (Hofmann, Carpenter, & Curtiss, 2018).

Perhaps the most important limitation is that Baron and Kenny (1986) developed the model of mediation and moderation based on a cross-sectional view of group data, while intervention research is more concerned with variables that are involved in *changes* and *processes* that are longitudinal and that may vary individual to individual. In order to link mediation and moderation to processes of change, it needs to be assumed that: (1) therapeutic change process can be reduced to a relatively simple input-output model; (2) the basic elements of this model can be limited to a relatively small number of variables (typically three when only examining mediation and four also considering moderation) that stand in a unidirectional relationship (i.e., the mediator influences the outcome, but the outcome does not impact the mediator); and (3) the influence of the proposed mediators and moderators are assumed to remain constant over time (i.e., only the outcome changes, whereas the influence of the mediators and moderators is time invariant).

All of these assumptions are extremely problematic when applied to therapeutic change at the level of the person. A wide variety of different variables influence the treatment process, and these variables are rarely uni-directional, but rather form complex dynamic networks that change

over time. Traditional methodological approaches are unable to capture the complexity of the treatment processes, let alone test treatment models.

Moderators have similar limitations when applied to the individual. Moderators are those variables "that affect the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable" (Baron & Kenny, 1986). More recently analysts have emphasized that moderators must be present before the beginning of intervention (Kraemer, Wilson, Fairburn & Agras, 2002; Kraemer, Kiernan, Essex & Kupfer, 2008). From the level of the individual being assessed in a dynamic fashion, however, what is more at issue is the identification of indicator variables that are present at the time in which treatment decisions are made, regardless of when that may be. Thus, when taking a process focus, it is important throughout the intervention to examine variables that impact the relationships between intervention and process of change or process of change and outcomes (Bauer, Preacher, & Gil, 2006).

Parenthetically, the terms *treatment mechanism* and *mechanism of change* have also been frequently used, with some authors arguing that the term "mediator" should not be used synonymously with "generative mechanism" because other variables besides the mediators can influence the change process (Tryon, in press). Kazdin (2007) similarly cautioned that even when mediators are known, it is still necessary to develop a pragmatically useful and theoretically consistent explanation of how a treatment can lead to the outcome. Our preference is to use the term *change process* rather than *mechanism* because the term *process* is less restrictive, allowing feedback loops and bidirectional relationships, whereas the term *mechanism* typically implies a more simplistic, unidirectional input-output model. The larger point, however, is that while nomothetic tests of mediation and moderation can provide an important starting

point for effectively targeting relevant aspects of an individual's psychopathology, they tell us little about the change processes occurring at the level of the individual. Identifying mediators and moderators is thus only a beginning step in understanding the change processes (Kazdin, 2007; Kazdin & Nock, 2003; Nock, 2007).

Consider recent results of classic methods of examining mediation and moderation when one simply adds in the common sense observation that different pathways of change may exist among individuals. Studies have provided support for Beck's cognitive model (Hofmann, 2004; Hofmann, Asmundson, & Beck, 2013; Beck & Haigh, 2014) by demonstrating that changes in maladaptive beliefs or schemas about the self, others or the world predict symptom change in CBT (see Hofmann et al., 2018 for a review). Similarly, analyses of change processes in Acceptance and Commitment Therapy and other related treatments have demonstrated that increases in cognitive defusion and experiential acceptance significantly mediate treatment outcomes (e.g., Gifford et al., 2011; Hesser, Westin, Hayes, & Andersson, 2009). Some studies have found that classic CBT methods are also mediated by cognitive defusion or experiential acceptance (e.g., Arch, Wolizky-Taylor, Eifert, & Craske, 2012; Hesser, Westin, & Andersson, 2014). It could be that changes in maladaptive beliefs, cognitive defusion, and acceptance are related in important ways or it could be that they are different pathways that can be deployed by individuals toward the same end: different routes around the same bush so to speak. When individual pathways are not fully modeled, these different processes could cancel each other out in a study at the group level. Or one or the other could be more dominant in a given study based on individual interactions that are hard to detect through assessment of central tendencies within a homogenized group. Many researchers do not realize that the results of common group

comparison designs *only* apply to the individual if one makes the implausible ergodic assumption that such individual differences do not exist (Molenaar, 2013).

Some authors have attempted to tackle this very issue by testing moderated mediation models that describe the individual characteristics that predict whether a given mediator is operating as a driver of change. For example, improvements in coping skills among patients with alcohol use disorder have been found to mediate drinking outcomes in response to CBT, but only for those with high baseline dependence severity (Roos, Maisto, & Witkiewitz, 2017). This is fine so far as it goes, but it is still is based on ergodic assumptions within moderated groups, ignores variables that become important after baseline, and is poorly suited to a full investigation of the large number of individual variables that may predict different pathways of change. The problem is not the number of individuals that need to be studied – it is the fact that the analytic approach begins and ends at the level of the collective in which individual pathways of change are treated as "error" in an attempt to detect consistencies and central tendencies that are only observable at the level of the group. In order to understand why and how changes happen in an individual, we need to study the processes of change at the level of the individual, and then to gather nomothetic summaries based on collections of such patterns.

Going Back to Psychology's Functional Analytic Roots

Understanding the change processes responsible for the amelioration of psychological problems is essential for both clarifying the most important targets of treatment, and for refining the scientific theories that are underlying the interventions. One of the original approaches for identifying such change processes at the individual level was functional analysis. Functional analysis involves the idiographic assessment of a target behavior and the context in which it occurs as a way to identify the functional relationship between variables that contribute to the

behavior (e.g., Haynes & O'Brien, 1990). This includes identifying the antecedents and consequences of a behavior of interest in order to develop hypotheses about the variables causing or maintaining the behavior (Yoman, 2008). Such an analysis paves the way for an individually-tailored intervention designed to modify the target behavior based on the causal relationships established in the initial analysis. The target and method of the intervention can then be altered in an iterative fashion depending on its outcome, thereby enabling a therapist to identify the processes responsible for symptom improvement.

Interventions based on a functional analytic assessment have demonstrated utility in improving clinical outcomes of some conditions (Ghaderi, 2006; Hurl, Wightman, Haynes, & Virues-Ortega, 2016; Miller & Lee, 2013), but the traditional functional analytic approach had a number of significant drawbacks. For one, usually only a limited number of contextual and psychological variables were considered, and they were typically formed into a simple model with unidirectional relationships among its components. Traditional functional analysis also ignored cognitive variables and the broader theories needed to adequately understand them (Hayes, Long, Levin, & Follette, 2013). As a result, empirical demonstrations of the utility of functional analysis were largely restricted to the area of children and adolescents with developmental disorders, likely because basic operant conditioning principles were thought to be sufficient to analyze and intervene upon problematic behavior in such conditions (Friman, 2010). For many other conditions, however, that is not the case. In addition, individual functional analysis is often complicated and time-intensive, relying on an unbiased specification of the functional relationships by individual clinicians, and therefore is not easily replicable (Follette, Naugle, & Linneroth, 1999). Consequently, although traditional functional analysis holds the advantage of being highly tailored to individual patient differences and contextual variables, it is

not the most practical approach for identifying broadly applicable processes responsible for change.

Idiographic Approaches for Identifying Change Processes

An intra-individual approach to psychotherapy requires a framework and research methodology that complements such idiographic aims. Randomized clinical trials have long been regarded as the gold standard for making inferences about the efficacy of treatment interventions (Woolfolk, 2015). However, to better understand intra-individual processes that underlie evidence based interventions, researchers need to consider alternatives to traditional nomothetic approaches that combine sets of individuals before the process of detecting longitudinal patterns has begun (Kazdin, 2016; Barlow, Nock, & Hersen, 2009). An intra-individual based approach seeks nomothetic generalizations by detecting patterns of change at the level of the individual, which are then collected into nomothetic patterns. Researchers who have argued for single-case or time series approaches have long maintained that group averages can obscure important individual differences (Barlow et al., 2009; Hayes, Barlow, & Nelson-Grey, 1999). Research has even shown that different answers about the impact of independent variables can be produced if evaluations are based on the group level first, as opposed to nomothetic evaluations based on individual analyses (Fisher, Medaglia, & Jeronimus, 2018; Hayes & Turner, 1996). This is why applying theories that are nomothetically generated to the individual can be risky: the equivalence of processes at the group and individual level needs tested, not simply assumed.

At one time, these two methodological approaches were virtually incommensurable. Recent statistical and methodological developments, however, have furthered the kind of idiographic research needed to advance this vision that can be deployed as part of randomized trials. These methods seem especially well suited as an approach to identify evidence-based

processes of change (Hayes & Hofmann, 2017). By identifying the processes responsible for promoting psychological well-being at the level of the individual and then summarizing them into nomothetic generalizations, process-based therapies (PBT) can be implemented to apply specific procedures to individualized problems that are designed to modify biopsychosocial change processes in specific contexts (Hayes & Hofmann, 2018).

As a first step toward realizing the promise of process-based therapy for individuals, the field will need to consider new and alternative methods of gathering data, even before they are analyzed. In this section, we outline some of the key innovations that are most relevant. All of them begin with far more frequent assessment of change processes in order to increase the intensity of the analytic focus at the level of the individual.

Ecological Momentary Assessment

While they originate from different research traditions, both Experience Sampling Methods (ESM) and Ecological Momentary Assessment (EMA) are systems of measurement that emphasize the collection of self-reported behaviors, cognitions, and/or emotions in the daily lives of individuals, either in real time associated with relevant events, or at one or more pre-determined sampling points daily (Trull & Ebner-Priemer, 2014; similar to other authors, we refer to EMA when we mean the collection of methods that might be described as either EMA or ESM). The development of EMA methods has been driven by both the strengths of collecting real-time data in context, as well as the weaknesses of relying on retrospective recall of important variables or events (Gorin & Stone, 2001). EMA methods can be characterized by the following important features: 1) data are collected in the ‘real world’, as clients or participants behave in natural settings, 2) assessment questions focus on the individual’s current state, as opposed to recollection of previous states [with the exception of daily diaries], 3) assessment is

organized by random intervals, set intervals, or around specific events as they actually occur, and 4) multiple assessments are collected over time, in order to study how events and responses to events vary (Stone & Shiffman, 1994).

Common methods in EMA research include surveys delivered via email or text message, paper or digital diaries, telephone surveys, electronic sensing devices such as smart watches or activity trackers, and applications loaded on to smartphones (Trull & Ebner-Priemer, 2009). Most EMA research uses either event-based or time-based sampling strategies. Event-based sampling focuses on specific events and data are collected around them, while time-based sampling focuses on collecting data over time without a focus on any particular event (Shiffman, Stone, & Hufford, 2008).

EMA has already begun to significantly impact intervention science. For example, a systematic review of EMA studies in mood disorders has identified multiple findings, including that a) positive and negative affect are associated with everyday events, b) that positive and negative affect are sensitive to treatment, c) that affective responses to emotional events normalize for treatment responders but not non-responders, and d) that remitted depressive patients are more likely to relapse if they report lingering physical symptoms, low quality of life, chronically high negative affect and stress, and low motivation for physical activity (aan het Rot, Hogenelst, & Schoevers, 2012).

The same group of researchers has also carried out a similar review for anxiety disorders. They found that a) the relationship between anxiety symptoms and other variables is often bidirectional, and that EMA was uniquely suited to discovering this phenomenon, b) patients with obsessive-compulsive disorder are actually quite accurate at recalling symptoms, compared to individuals with panic disorder or PTSD, and c) EMA can help describe, predict, and explain

the course of treatment for an individual (Walz, Nauta, & aan het Rot, 2014). EMA has also been used to demonstrate that for people with schizophrenia, it is easier to differentiate between different negative emotions in daily life than it is to differentiate between positive and negative emotions more broadly, and that this possibly contributes to deficits in social functioning (Kimhy et al., 2014).

EMA raises a number of challenging issues (Ram, Brinberg, Pincus, & Conroy, 2017). Seemingly simple choices in study design can have a major impact, for example (Kockler, Santangelo, & Ebner-Priemer, 2018). Most forms of analysis of EMA requires multi-level models that are still focused on the collective level of data in parsing out the means and variances of important study variables (Hedeker, Mermelstein, & Demirtas, 2012; for more comprehensive overviews of EMA methods, see Csikszentmihalyi & Larson, 1987, Stone & Shiffman, 1994, and Shiffman, Stone, & Hufford, 2008). Thus, while EMA moves analyses toward the level at which change processes occur, effective use of EMA will require analytic improvements in clinical science.

Measures of Processes in Session

Measurement strategies that rely on assessments every session may be crucial in evaluating the impact of functionally important processes. These frequent assessments could consist of short self-report instruments, or coded behaviors within treatment. The latter approach has particularly long history (e.g., Greenberg, 1986). The success of the investigation of change processes based on in session coding is linked to the adequacy of measurement and its underlying theory, but there are modern examples that provide useful guidance. For example, coding of affective interactions during an initial counseling session have been used to predict subsequent dropout and suggest important aspects of the therapeutic relationship (Luedke,

Peluso, Diaz, Freund, & Baker, 2017). An analysis of therapy transcripts has been used to seek and to identify mediators of change in psychotherapy (e.g., Hesser et al., 2009). The Functional Analytic Psychotherapy Rating Scale (FAPRS; Callaghan, Follette, Ruckstuhl, & Linnerooth, 2008) has been used to code therapeutic interactions using idiographic functional categories, with some evidence of its treatment utility as applied to adaptive social functioning (Villas-Boas, Meyer, & Kanter, 2016).

Machine learning approaches have already been applied to psychotherapy transcript analysis (Gaut, Steyvers, Imel, Atkins, & Smyth, 2017). As transcription and coding technology becomes more convenient, automated, and rapid (Glynn, Hallgren, Houck, & Moyers, 2012), it will be increasingly easy to input actual interactional behaviors into the search for treatment processes at the level of individuals first, generalizing to collections of clients second. Parenthetically, this same point applies to processes that are inherently social since by "the individual" we mean here the focal unit intervention, be that a person, couple, or family. For example, extensive research has been conducted on relationship factors that relate to treatment outcomes at the nomothetic level, including therapeutic alliance, group cohesion, therapist empathy and positive regard, collection of client feedback, goal consensus, and collaboration (Norcross & Wampold, 2011a). It is important to examine these variables in ways that treat a specific client-therapist relationship as the unit of interest. Using machine learning and other techniques to better understand and then ultimately provide feedback on idiographic session by session processes that influence such factors could further clarify the role elements of the relationship play in therapeutic change.

Measures of Social, Psychological, and Physical Context

Taking a person specific approach to psychological change requires more attention to context. In addition to the active components of treatment, patients experience a variety of circumstances outside of therapy per se. Environmental and social factors may influence the direction and impact of treatment or treatment may lead to dramatic changes in social and environmental interactions. For example, in a study examining the impacts of CBT on quality of life in elderly adults, researchers found that changes in satisfaction with social support predicted outcome above and beyond inclusion in the treatment group (LaRocca & Scogin, 2015). Satisfaction with social support was shown to moderate the effect of CBT, which was theorized to be because elderly adults with more adequate social support were better able to practice the skills taught in the intervention with others. In another example, poorer sleep quality has been shown to predict slower improvement and higher posttreatment severity of social anxiety symptoms in the context of a CBT trial (Zalta et al., 2013). Lack of quality sleep may be related to diminished attentional or memory processes during treatment or a proxy for socio-environmental variables of importance such as workplace conditions or family structure. Research looking across different treatment approaches has also shown that factors related to treatment preferences, religion and spirituality, culture, and an internalizing versus externalizing coping style influence therapy outcomes (Norcross & Wampold, 2011b).

These are examples of the kinds of contextual indicator variables that may impact change processes. It is worth noting that these are not necessarily moderators in a classic sense. To take the examples just mentioned, sleep or social support may themselves be impacted by CBT, even though they also may determine how CBT impacts clients. Measurement of indicator variables of this kind may thus inform the ordering or applicability of treatment modules.

A focus on the individual requires attention to contextual processes that exist at the group level. People are nested inside families, friendship groups, work groups, and societies. In an example of complementary effects, Parker et al. (2015) showed that group-level hope improves individual level of well-being over and above individual level hope suggesting that hope interventions focused on the group (e.g., “team bonding”) might augment individual interventions and vice versa. In an example of moderation effects, Sahdra, Ciarrochi, Parker et al. (2018) showed that individual level stigma has no negative effect on well-being if the person is nested in a group for which stigma is not salient, but has a significant negative effect within stigmatized groups suggesting the central importance of stigma as a target in this social context.

Outcomes Valued by Clients

A move away from DSM-based diagnostic categories as the primary way of identifying treatment targets implies a movement away from the reliance on traditional self-report symptom instruments such as the Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996) or PTSD Checklist for DSM-5 (PCL-5; Blevins, Weathers, Davis, Witte, & Domino, 2015). This presents analytic challenges in collecting cases under functionally similar goals. Behavioral measures such as number of friends, job status, relationship status, social functioning, or smoking status are becoming more dominant as the DSM era wanes, but the range and number of specific behaviors to be examined is daunting. Measure of general well-being such as quality of life present a useful alternative. For example, the Quality of Life Inventory (QOLI; Frisch, Cornell, Villanueva, & Retzlaff, 1992) and World Health Organization Quality of Life (WHOQOL-BREF; Skevington, Lotfy, & O’Connell, 2004) have been widely studied and have been shown to be both responsive to treatment and related to important life outcomes. Measuring the frequency with which a person engages in patterns of behavior that are linked to their stated

values is another possible way to cluster and simplify outcome assessment. Values-based behavior has been shown in some studies to mediate changes in quality of life (Hayes, Orsillo, & Roemer, 2010) and even other behavioral outcomes (Lundgren, Dahl, & Hayes, 2008). The Valuing Questionnaire (VQ; Smout, Davies, Burns, & Christie, 2014) is an example of the assessment of client values that apply to a given individual.

Analytic Methods

The use of more frequent, broader, and more contextually focused assessment sets up the use of more appropriate analytic tools for the detecting of person specific patterns of change, such as time series analysis, complex network models, and dynamical system models. These then need to be combined in appropriate ways to reach nomothetic generalizations.

Time Series Analyses

Intra-individual change processes can be examined by using time series analyses of individual participants throughout the course of treatment, which involves building a statistical model of the relationship between changes in relevant variables for each individual participant. For example, Dugas, Francis, and Bouchard (2009) used autoregressive-moving average modeling to examine the directionality of changes in somatic anxiety and worry over the course of CBT and applied relaxation for generalized anxiety disorder (GAD). Contrary to expectations that directionality would differ across treatments, they found that most patients in both conditions demonstrated a reciprocal relationship between changes in the two symptom domains.

In two different studies, Boswell, Anderson, and Barlow (2014) and Boswell and Bugatti (2016) used time series analyses with individual patients to examine temporal patterns of change constructs (e.g. mindfulness, reappraisal) with anxiety and depression symptoms, and in relation to the introduction of distinct transdiagnostic treatment modules. While these studies found some

evidence of process variables showing greatest improvement in response to expected interventions (e.g. increased mindfulness ratings during a present-moment nonjudgmental awareness intervention), Boswell and Bugatti (2016) also found that for one patient, intervention strategies did not have a clear impact on change variables despite overall symptom improvement during treatment.

Together these types of studies illustrate the potential for developing models of individual processes of change, and specifically the causal and temporal relations between symptoms, constructs theorized to underlie change, and specific intervention strategies. However, the measurement of symptoms and change constructs in such studies is still done at the nomothetic level, wherein a measure of depression, for instance, is presumed to operate similarly across individuals. Haynes, Mumma, and Pinson (2009) argue that the precision with which researchers are able to establish causal relations among processes of change depends on the extent to which the measures being used adequately captures the dimensions and attributes of the targeted construct. Accordingly, they outlined an approach to idiographic assessment in which factor loadings of items on a measure are individualized for each person based on scores obtained over repeated assessments, thus capturing individual differences in the underlying factor structure of a target construct.

Building off such an approach, Fisher (2015) developed a dynamic assessment model to identify the underlying structure of GAD symptomatology among 10 individuals receiving daily assessments of symptom or related behaviors over a 60-day period. Results revealed different dynamics of symptom relations across participants, with some individuals demonstrating a pattern in which greater levels of avoidance led to subsequent reductions in worry and anxiety, whereas others exhibited the opposite pattern. Not only do such findings reveal the important

differences in symptom relations resulting from an idiographic approach to assessment, they also have implications for personalizing interventions, as targeting symptom clusters that drive changes in other symptoms for an individual could be beneficial (Fisher & Boswell, 2016).

The heterogeneity in the symptoms dynamics across individuals led Fisher (2015) to suggest that treatment recommendations can be individualized using this information. For instance, one patient exhibited dynamics such that greater avoidance led to subsequent reductions in distress, whereas another patient had dynamic patterns indicating that greater avoidance led to increased levels of worry. Different treatment strategies for these individuals might be warranted to provide maximally efficacious treatment (e.g., whether to introduce *in vivo* exposures early or later in treatment). In this approach, intensive time-series data facilitates the delivery of therapeutic content in a hierarchical sequence that directly corresponds to presenting dynamics.

Complex Network Approaches

Network approaches have a long history in mathematics as part of graph theory, and they have recently made a big come-back in several scientific disciplines (e.g., physics, genetics biology, economics, ecology, neuroscience, etc.). In brief, the chief objective of network approaches is to represent a system in terms of *nodes* (i.e., variables of interest) and *edges* (i.e., connections between different nodes). These networks can be examined based on the network structure or, if the network changes over time, based on the network dynamics (also known as dynamic systems). Recently, network methodology has been applied to clinical psychology as a framework to model mental disorders (Hofmann, Curtiss, & McNally, 2016; Borsboom & Cramer, 2013, Curtiss & Klemanski, 2016; Curtiss, Ito, Takebayashi, & Hofmann, in press). Some authors have suggested that a network approach to psychopathology circumvents several

of the limitations associated with the latent disease model (Borsboom & Cramer, 2013; Hofmann, Curtiss, & McNally, 2016). Namely, the network approach does not require the assumption that symptoms are expressions of an underlying disease entity. Rather, network models permit direct associations between individual symptoms or features of psychopathology.

Several statistical frameworks have recently been adopted to facilitate the investigation of dynamic processes (Epskamp, van Borkulo, et al., in press; Epskamp, Waldorp, Mottus, & Boorsboom, *in press*; Scheffer et al., 2009; van de Leemput et al., 2014). In dynamic networks, nodes reflect features of psychopathology (e.g., anhedonia, insomnia, etc.), and directed edges can be specified to represent partial regression coefficients connecting different nodes. Because directed edges specify the direction of a relationship, such networks can provide potential information about granger causality using intensive time-series data (Epskamp, Waldorp, Mottus, & Boorsboom, in press). This occurs because each node is regressed onto other time lagged nodes (*t*-1), permitting estimation of temporal precedence. Both autoregressive and cross-lagged effects are possible. One approach to examine dynamic networks includes individual vector autoregressive analyses and multilevel vector autoregressive analyses. A more thorough elucidation of these analyses is beyond the purview of the current discussion, but they have been explicated elsewhere (Epskamp, van Borkulo, et al., in press). Such dynamic networks can convey idiographic information about how certain processes unfold over time for each individual. For example, in the case of a single patient who underwent EMA, an individual network structure may be derived. Both temporal and contemporaneous effects may be estimated, providing information about the associations between nodes both across and within the same time measurement window, respectively. The temporal network structure might reveal that certain nodes (e.g., fatigue) prospectively predict other nodes (e.g., rumination) at a later

time point, whereas a contemporaneous network might reveal that some nodes (e.g., anhedonia) are related to other nodes (e.g., low mood) in the same time window.

The temporal network structure might then provide important clues about the causal impact a node has on the whole network and how this might differ across different individuals (see Figure 1). These individualized networks have the potential to inform treatment strategies. The constituent components of a complex network can be strongly interconnected, which can influence how the system transitions from one state to another. Specifically, a network might initially be resilient to change until it reaches a tipping point, which causes a sudden transition to an alternative state (Nelson, McGorry, Wichers, Wigman, & Hartmann, 2017). Such a dynamical systems approach has been applied to several fields that involve complex systems, such as ecology and the biomedical sciences (Gsell et al., 2016; Rikkert et al., 2016). In clinical psychology, there have been recent attempts to reconsider mental disorders as instances of complex systems which can be mathematically modelled using a dynamical systems framework (Hayes et al., 2015; Lutz et al., in press; van de Leemput et al., 2014; Wichers & Groot, 2016). Instead of conceptualizing psychopathology as a static phenomenon, a dynamical approach emphasizes transitions between states of pathology and health.

An important indicator of an impending transition or tipping point is *critical slowing down* (Hofmann et al., 2016; Scheffer et al., 2009). This refers to the fact that a complex system recovers more slowly from small *perturbations* (i.e., an external influence that causes a change in a system) when approaching a tipping point. For example, slower recovery times from significant life stressors could be evidence for critical slowing down that might predict a tipping point from a state of health to psychopathology (Nelson et al., 2017). The opposite pattern can be examined as well (i.e., critical transitions from psychopathology to health), which has relevance

to intra-individual approaches to psychotherapy. Evidence of critical slowing down in a particular patient undergoing psychotherapy might be able to predict sudden gains in symptom remission. A number of statistical metrics have been proposed to model critical slowing down. One of the most frequently applied indices of critical slowing down is autocorrelation. Several studies have recently used EMA methodologies to examine whether time-lagged autocorrelations of certain variables can predict large changes in symptoms across time (van de Leemput et al., 2014; Wichers et al., 2016).

Obviously, different variables might undergo critical slowing down in response to different components of treatment and in the context of different pathologies. Thus, there is the potential for considerable individual differences in what predicts treatment-related tipping points. The use of EMA during psychotherapy permits the exploration of autocorrelation in several symptoms of interest, which can facilitate an idiographic strategy to identify meaningful intervention components that promote sudden transitions to health.

Observation Oriented Modeling (OOM)

OOM provides another example that could be extended to examine processes throughout the course of treatment. OOM prompts the experimenter to specify *a priori* patterns in data and calculates the percentage of participants following this pattern (Grice, Barrett, Schlimgen, & Abramson, 2012; Grice, 2015). For example, in clinical trials addressing mediation experimenters may make the following hypotheses, 1) allocation to the treatment group is associated with improved outcomes 2) those in the treatment group will demonstrate gains in the proposed mediator, and 3) observed level of the mediator will be positively related to outcome. An OOM analysis would calculate the percentage of participants who followed the specified patterns. In this way, the model will either be shown to be useful, or orient the researcher to point

of failed (e.g. treatment failed to move the mediator, an incorrect mediator was specified). This analysis also points to the need to distinguish variables which influence treatment response. In the hypothetical study above, if it were found that 76% of participants followed the expected pattern of results, this would both provide relatively strong support for the model and illuminate a substantial and important subgroup of non-responders in need of further investigation. There is nothing in the OOM approach that requires that it be limited to traditional views of moderation or mediation.

The Nomothetic Organization of Change Processes

In arguing for the importance of the individual level of analysis, we are not arguing that change processes need to be thought of only in a bottom up way. Indeed, nomothetic generalizations are helpful is examining change processes that apply at the level of the individual. Traditional functional analysis provided an example of how nomothetic conceptual sets (e.g., behavioral principles) can foster idiographic exploration, even though an analysis based purely on direct contingencies proved too narrow for it to succeed. Other examples exist that attempt to bridge the gap between nomothetic and idiographic processes of change. Work in the mixed methods domain of research studies, for instance, has used qualitative research that draws from an understanding of individual clients' experiences to generate conclusions about broader process-focused principle for therapeutic practice (Elliott et al., 2009; Fishman, 2017; Fishman, Messer, Edwards, & Datillio, 2016; Levitt, Pomerville, & Surace, 2016). Systematic case-study research offers another avenue toward nomothetic organization of individual change processes (McLeod & Elliot, 2011).

In mathematical terms, it is legitimate to develop process models based on the group that are said to apply to the individual only if the two levels are ergodic (Krendel, 1985), which is not

the case with non-stationery processes (e.g., developmental processes) nor with dynamic models that are heterogeneous across individuals in the population (Fisher et al., 2018). If the analyses begin at the intra-individual, however, heterogeneity may itself enter into the nomothetic generalization process. An example of a statistical technique that systematizes that approach in complex networks is Group Iterative Multiple Model Estimation (GIMME; Gates & Molenaar, 2012).

In addition to new analytic approaches, it seems important to have a way of speaking more generally about processes of change and models that summarize them, so that results with different processes and models can be compared and translated into therapy. There is no consensus models of change processes. There have been recent attempts to integrate information about change process across a range of CBT methods (e.g., Hayes, Villatte, Levin, & Hildebrandt, 2011), but so far these have been built atop specific theoretical models. It would be unfortunate to replicate the cacophony of protocols with a similar body of competing process models, devoid of any common language or comparative structure.

The possible consilience of an evolutionary approach. An alternative conceptual set appears able to provide a beginning systemization of our currently available literature on process of change, and models linked to them. In the life sciences generally all phenotypic forms and processes are commonly argued to be linked to evolution, and analysts proposing a function for a physiological system are expected to be able to provide an evolutionarily sensible account of how that could have occurred. That approach has not yet taken hold in the behavioral and cognitive sciences. Evolutionary principles that are excessively focused on genetics do not lend themselves to such a purpose, but the shift to modern multi-dimensional, multi-level

evolutionary accounts makes it much easier to extend an evolutionary conceptual umbrella over process-based systems in the behavioral sciences.

An evolutionary approach can be distilled down to six key concepts: variation, selection, and retention, in context, at the right dimension and level (Wilson, Hayes, Biglan, & Embry, 2014). Therapists have generally applicable ways of talking about variation, selection, retention, and context: they seek changes that work well for the person (variation and selection), and that can be built into larger habitual patterns that fit the client's situation (retention and contextual fit). Systems of change processes in psychological intervention apply those concepts to specific dimensions of psychological development (affective, cognitive, behavioral, attentional, motivational and so one). For example, a cognitive therapist may have ideas about how encourage new and more effective ways of thinking (variation and selection within a cognitive domain), and how to create habitual patterns of healthy thinking that better meet certain life situation (e.g., homework tasks that encourage more rational thought processes relevant to areas of concern).

Systems of change processes can also focus on different levels of analysis and their interactions. The actions of people considered as individual can be linked to underlying physiology, such as brain circuits, genetics and epigenetics, on the one hand, or viewed as being nested within relationships, social groups, or cultural communities on the other.

By combining all six evolutionary concepts, a broad conceptual space for the exploration of adaptive and maladaptive change processes is created. It organizes a kind of multi-dimensional multi-level "functional periodic table" for change processes and the models that organize them.

This conceptual space is shown in Figure 2. The top six rows are dimensions of development at the individual level, nested within the two levels in the bottom two rows. An analysis *entirely* focused on either of the two levels at the bottom would lead to another matrix of dimensions appropriate to that level (e.g., anthropological, sociological, biological, and so on).

Each dimension and level can be examined in terms of variation and selective retention in context. As is shown in Figure 2, different "stacks" can be created of processes that lead to pathology and those that lead to health.

In essence, this diagram is a kind of "model of models" of change processes based on the synthesis that is afforded by modern multi-dimensional, multi-level evolutionary accounts (Wilson & Hayes, 2018). It is meant not so much as a prescriptive guide, as it is a way of creating finding a common language in which to consider and compare models of change processes.

For example, suppose the impact of mindfulness training was shown to be mediated by changes in attentional control: those receiving the training were more able to broaden or narrow their attentional focus, or to stay focused on one thing or to shift attention to another. Broaden, narrowing, staying, or shifting are all ways of speaking about variation (in this case, in attention). Suppose researchers also showed that people were now better able to deploy attentional strategies to fit task demands, and as a result were less needlessly anxious and more effective in deploying existing behavioral skills in emotionally challenging situations. These processes bear on the selection of attentional strategies, and the adaptive use of these strategies to create more effective sensitivity to the task environment, augmenting behavioral performance and weaken emotional interference. If such a set of findings existed fit into the conceptual space as is indicated in Figure 3, with change being fostered by attentional variation, selection, and

contextual sensitivity, which in turn fostered more contextually sensitive and functional affect and action.

In addition to mapping change processes for the purpose of specification and comparison, this multi-dimensional and multi-level "functional periodic table" approach also suggests whether particular PBT models are sufficiently broad or coherent. Models are ways of organizing particular combinations of rows, columns, and stacks (maladaptive or adaptive; see Figure 2). If entire rows or columns or stacks are missing in a given model, identification of change processes in the missing areas suggest limits on the underlying model. Conversely, if there are several competing models that are reasonably comprehensive, the clarity of the "functional periodic table" approach may refine and enhance their empirical comparison. For example, attentional control theory (Eysenck, Derakshan, Santos, & Calvo, 2007) or meta-cognitive theory (Well, 2002) might both focus on attentional processes as is shown in Figure 3, but might different in the range of other processes that are implicated by their accounts.

Testing Idiographic Process Models Experimentally

As different models appear it is important that they be tested both at the level of individuals and at the level of collections of individuals. For example, a two-arm randomized trial might compare a more static "one size fits all" treatment approach to the therapeutic impact of a particular model of how best to link change processes to treatment decisions. This empirical approach to the evaluation of process-based theoretical models essentially uses their "treatment utility" as an outcome metric (Hayes, Jarrett, & Nelson, 1987; for recent examples see Levin, Navarro, Cruz & Haeger, 2018 or Weisz et al., 2012), and considers their conceptual utility in terms of the strength of their process to outcome impact. The same approach could readily be extended to comparisons between various models of PBT.

Additional Advantages of a Process-based Idiographic Focus

The notion of focusing on the individual in clinical science is hardly new. Warren Thorngate (1986) offered a useful summary of the nature of knowledge progression from an idiographic perspective:

> To find out what people do in general, we must first discover what each person does in particular, then determine what, if anything, these particulars have in common…nomothetic laws lie at the intersection of idiographic laws; the former can be discovered only after we find the latter. (pp. 75-76)

There are other possible benefits to taking a modern process-based idiographic approach.

Greater Cultural and Contextual Sensitivity

Idiographic approaches to diagnosis and treatment in psychotherapy are relevant and likely to be useful when issues of diversity or minority clients are the focus (Lee & Tracey, 2005). Establishing consensus regarding how to conceptualize these issues, as well as teach therapists in training to understand them, has proven difficult (Suzuki, 2001; Ridley, 2001; Bernal, Jimenez-Chafey, & Rodriguez, 2009). By bringing a bottom-up idiographic approach to the field of evidence-based therapy, both research and clinical goals are altered. Researchers will need to formulate processes and specify either how they might be cross-cultural in nature or develop a model of how cultural variables interact with change processes in a form of moderated mediation. For clinicians, instead of superimposing broad strokes of (potentially biased) cultural knowledge, intensive assessment and engagement with diverse clients will drive the formulation of case conceptualizations that include an account of how culture and identity manifest in context.

The Use of Evidenced-based Treatments

For years, many practitioners have struggled with the notion of empirically supported treatments. The concern that client needs are being ignored in the "protocol for syndromes" version of evidence-based therapy is based on a number of issues: the role of general factors in therapy (Hofmann & Barlow, 2014); the dominance of "how to" rules over applicable principles (Levitt, Neimeyer, & Williams, 2004); the demand that treatments be "locked down" to a technological definition (Mohr et al., 2015); and intrusion of the economic interests of treatment developers into training and deployment (Rosen & Davison, 2003). An idiographic focus on processes of change alleviates all of these concerns and promises to engage practitioners in a more meaningful focus on scientific evidence. The single biggest objection to the use of evidence-based treatments by clinicians is that they negatively impact sensitivity to treatment change processes (Ashcraft et al., 2011). In addition, by noting key change processes practitioners are better able to provide evidence-based kernels – units of behavioral influence found to be effective and to have their effects through specific mechanisms of change – rather than entire protocols (Embry & Biglan, 2008). There is evidence that such a modular approach is more efficient and effective (Weisz et al., 2012).

Providing More Useful Proximal Feedback

One of the more shocking but consistent findings about psychotherapy is that overall experience and training predicts confidence but not competence (Christensen & Jacobson, 1994; Erekson, Janis, Bailey, Cattani, & Pedersen, 2017). It is shocking in part because there is a vast literature across a wide range of fields suggesting that experience generally *does* predict performance, but that rule applies only if experience and training is focused on specific tasks with immediate and functionally accurate feedback (for a summary in the area of health providers, see Ericsson, 2004). What these two facts most suggest is that the usual immediate

feedback provided to psychotherapists in the form of client approval, satisfaction, or symptom change is not sufficiently linked to longer term effectiveness to be very useful in shaping truly useful clinical expertise.

Organized psychology has defended the role of clinical expertise (APA, 2006) but has not provided clear guidance about how it can be achieved beyond professional credentialing. A focus on empirically established change processes and their moderators provides a possible way out of this conundrum.

Change processes represent proximal features of a clinical case over time that reliably predict longer-term outcomes. If the failure of experience to predict competence is a feedback problem, a process-based focus may provide practitioners with the kind of immediate and functionally useful feedback that appears to be necessary in other domain for experience to lead to expertise. For example, previous research has shown that changes in the way that clients talk about their thoughts during psychotherapy sessions mediates follow-up outcomes (Hesser et al., 2009) – in effect providing a marker of real progress for practitioners to track in session.

Simplifying Training

If intervention science can create a taxonomy of evidence-based processes linked to evidence-based procedures, the field will have gone a long way toward simplifying the training needed to produce competent delivery of evidence-based methods. In the current model, evidence-based therapists either need to restrict their practice to specific syndromes or to acquire expertise in a wide variety of protocols for a variety of syndromes. Each treatment approach carries with it their own assessment methods, terminology, and techniques, that nonetheless need to be tailored to the individual as necessary. The process-based vision is one of coherent sets of change processes that can be applied to a wide array of problem-domains in an individually

tailored manner – presenting practitioners with a less daunting training task of using change processes to fit treatment kernels to client needs. There is no need in this approach for a priori commitments to "schools," or protocols.

Such a system could also diminish fruitless debates over levels of analysis (e.g., It's the brain; no it's the therapeutic relationship), or preferred dimensions of psychological development (e.g., it's cognitive; no, it's behavioral), independent of the specific needs of specific clients. Therapists and researchers would instead shift their focus to the most important biopsychosocial processes for a given clients and methods that move them, with greater freedom to examine processes and methods across traditions and approaches. This promises to reduce "win/lose" battles over broad traditions or theories. The field has struggled to reach widespread resolution over many such issues (i.e., Li, & Julian, 2012; Abry, Hulleman, & Rimm-Kaufman, 2015) and the "protocols for syndromes" has failed to resolve them. It is time to move forward.

Conclusion

Our argument for a process-based approach is that it will allow evidenced-based therapy to move beyond the pitfalls of protocols for syndromes that have slowed scientific progress and have made the notion of evidence-based therapy unpalatable to many. By targeting individual client needs and maintaining a focus on change processes, programs of intervention research can be developed that more fully integrate idiographic and nomothetic approaches. The issue is not one of numerosity – it is one of level of analysis. Intensive, frequent assessment linked to modern time series and network analyses can be imbedded in randomized controlled intervention trials, allowing a program of research to emerge that is sensitive to the individual at the same time as nomothetic questions are examined, without violating logical and statistical assumptions. The goal is to derive a theory-guided and testable mode of the processes that are involved in

treatment. We provided a structure for this enterprise in the form of a multi-dimensional and multi-level “functional periodic table” approach, but other ways of summarizing and discussing differences between process-based models may be possible. Over time various PBT models will emerge that can be examined using more traditional randomized control trials, but with greater attention to culture and context, treatment utility, and client needs and goals. Such a program of research is likely to provide richer and more clinically useful nomothetic information applicable to individuals who seek help from therapists and other behavior change agents.

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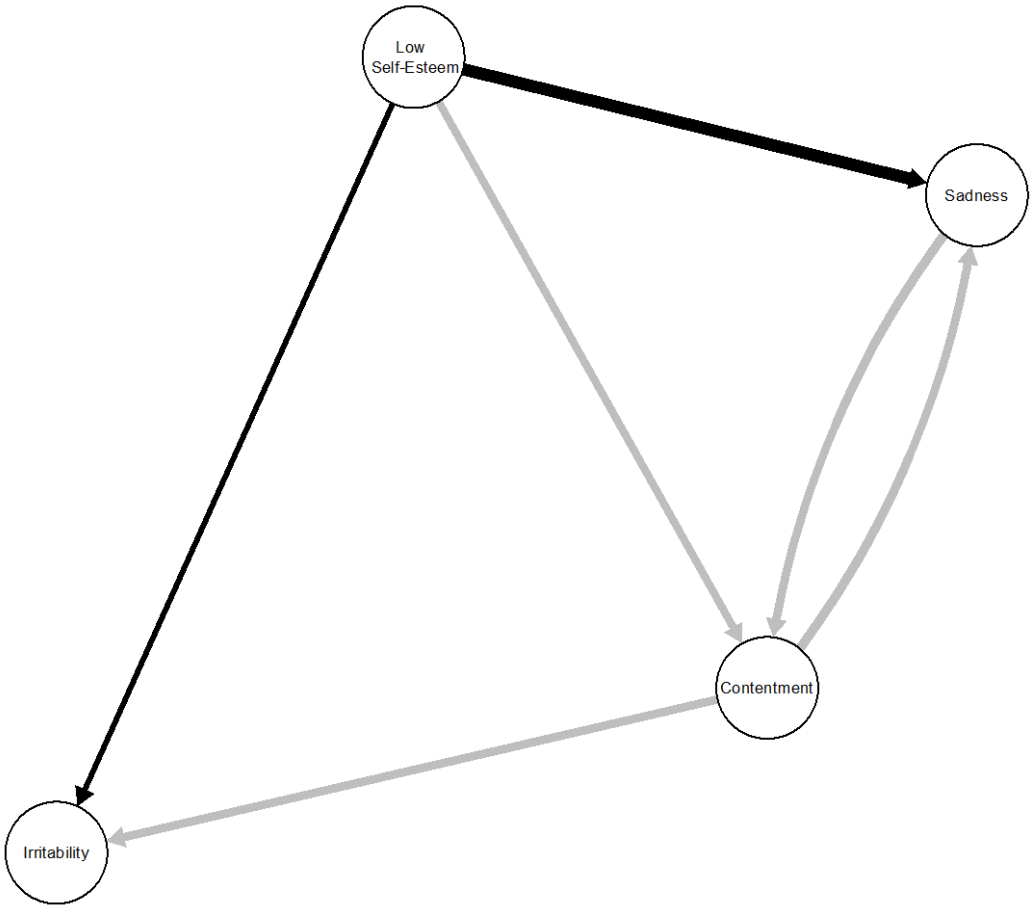
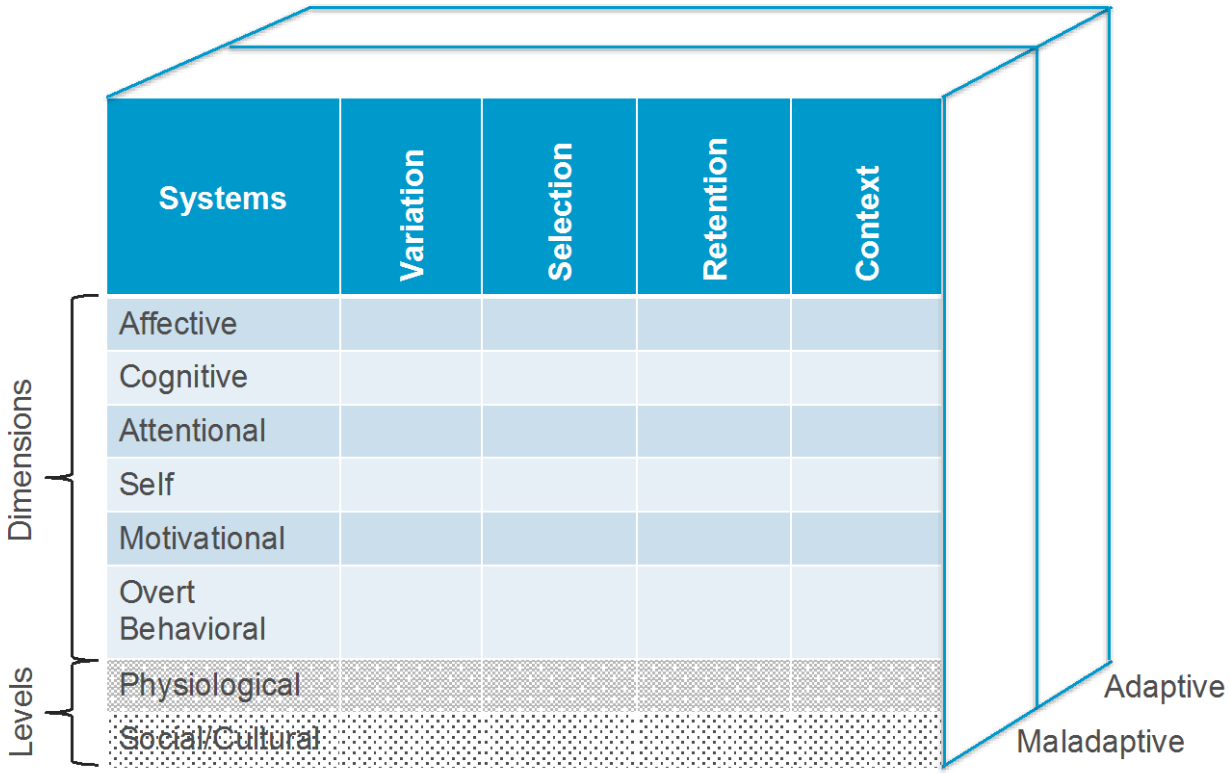
Figure Caption

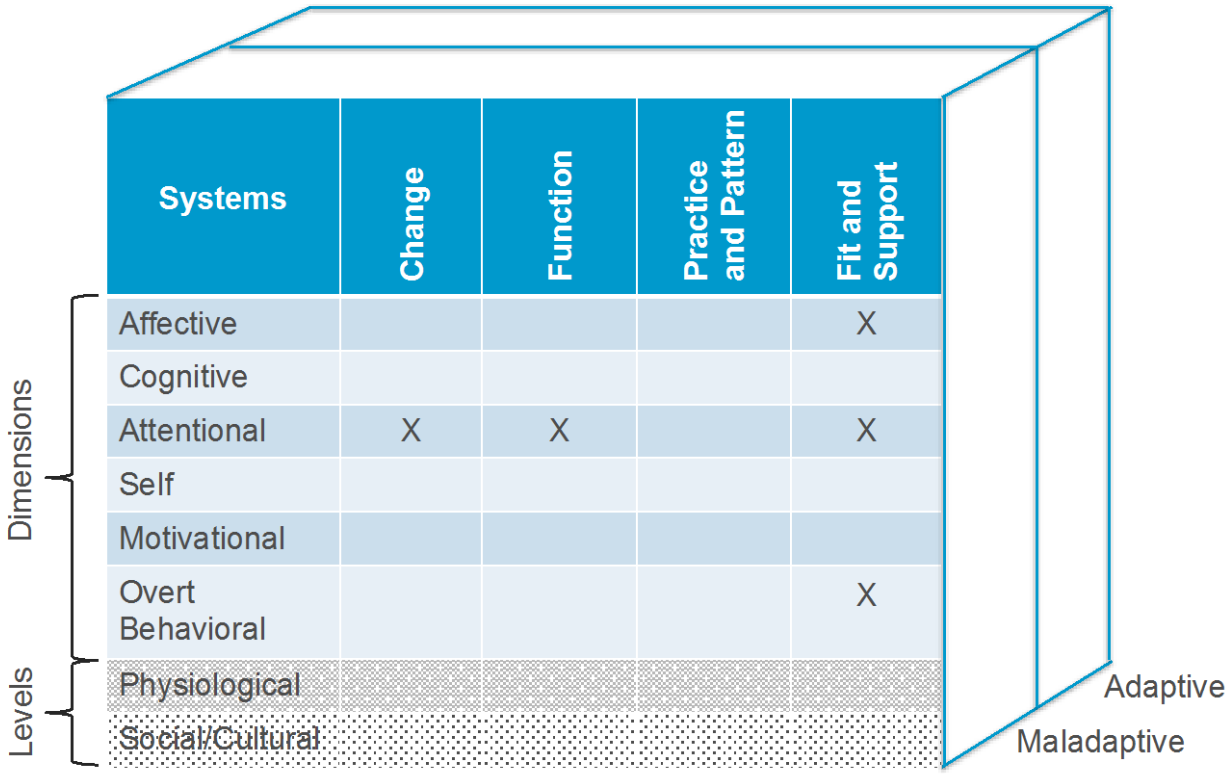
Figure 1. An example of an individual patient network. Black edges represent positive regression coefficients, and grey edges represent negative regression coefficients. Non-significant edges were omitted. The directed edges specified between nodes reflect cross-lagged (t-1) associations. As can be seen in this network, the patient's low self-esteem at a given time is associated with increased levels of sadness and irritability, as well as decreased levels of contentment, at the next time point. Low self-esteem appears to be an influential node in the network. This is adapted from Hofmann & Curtiss (2018).

Figure 2. A conceptual space for the examination of adaptive and maladaptive change processes, and the models that integrate them in terms of the "functional periodic table" provided by modern multi-dimensional, multi-level evolution science. Note that the bottom two rows represent nested levels of analysis relevant to the psychological level – although not the topic of this paper, a full explication of these levels would require similar matrices of their own. This figure uses common evolution science terms for the columns, but see Figure 3 on that point.

Figure 3. A hypothetical practical example of mapping evidence regarding change processes to a multi-dimensional, multi-level functional periodic table. This figure uses common clinical terms for the columns that represent the central evolution science concepts of variation, selection, and retention, in context.


Low
Self-Esteem
Sadness
Contentment
Irritability


Systems
Variation
Selection
Retention
Context
Affective
Cognitive
Attentional
Self
Motivational
Overt Behavioral
Physiological
Social/Cultural
Dimensions
Levels
Adaptive
Maladaptive


Systems
Change
Function
Practice and Pattern
Fit and Support
Affective
Cognitive
Attentional
Self
Motivational
Overt Behavioral
Physiological
Social/Cultural
X
X
X
X
Dimensions
Levels
Adaptive
Maladaptive