cally supported treatments[5]. His partner A. Ehlers has a "kinder gentler" cognitive approach to the treatment of post-traumatic stress disorder that is as efficacious as prolonged exposure, with considerably less attrition. P. Salkovskis knows more about the treatment of obsessive-compulsive disorder than anyone else I am aware of and would be my "go to" person for a really tough patient that I did not fully understand. C. Fairburn generated the single most crushing defeat for another therapy in the literature when 20 weeks of his CBT for eating disorders was more than twice as efficacious as two years of dynamic psychotherapy[6]. D. Freeman is doing some very innovative work with virtual reality in the treatment of paranoid ideation in the schizophrenias[7]. As best I could surmise, the crux of what these colleagues all do is to talk with their patients to get a sense of the idiosyncratic beliefs shaping their problematic behaviors and of what kind of experiences would be required to produce change. The approach they seem to share is to move from open-ended conversations with their patients to identifying possible mechanisms that they then use to develop intervention strategies that they test first in analogue studies and then in clinical trials[8]. This process is anything but formulistic and it is incredibly successful.

If Hayes and Hoffman can improve on this record for even some, I am all for it and I would not bet against them. As the authors suggest, the "second wave" (cognitive) stood on the shoulders of the "first wave" (behavioral), and it seems right and fitting that the "third wave" should do the same. I wholly agree that we want to follow principles, not protocols, and that the processes that generate and maintain the problems our patients encounter will provide guidance along the way.

I have become enamored with an evolutionary perspective in recent years, and I understand from our conversations that this is true of the authors too. I have come to think of most high-prevalence low-heritability psychiatric "disorders" that revolve around negative affect, such as depression and anxiety, as adaptations that evolved to serve a function in our ancestral past[9]. I put the term "disorders" in quotes because these adaptations are neither diseases (there is nothing "broken in the brain") nor "disorders"; rather, they coordinate an integrated but differentiated array of whole-body responses to various environmental challenges that increased the reproductive fitness of our ancestors. These evolved adaptations are at least as well treated with psychosocial interventions that facilitate the functions that they evolved to serve as they are with medications, and the former often have an enduring effect that medications simply lack. The low-prevalence high-heritability disorders like the schizophrenias or psychotic bipolar disorder likely are "true" diseases in the classic sense of the term and at this time are best treated with medications.

Not all that comes down to us from the past is necessarily wrong, but I do think that any "good idea" tends to be taken too far. When you have a hammer, everything becomes a nail. Variation, selection and retention are the essence of evolution. Mutations produce variation, some of which is selected if it outperforms its competition and, if it does, it is then retained in the genes. This process that differentiates and improves the species can do the same for treatment interventions. The authors are to be congratulated for thinking outside the box (introducing variation). If what they produce can outperform the competition, "third wave" processes will thrive and be retained.

Steven D. Hollon
Department of Psychology, Vanderbilt University, Nashville, TN, USA

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Process-based and principle-guided approaches in youth psychotherapy

We appreciate the rich, thought-provoking paper by Hayes and Hofmann[1], including their inspiring account of the work of so many intervention scientists on whose shoulders we all stand. The directions they propose warrant close attention by all of us who seek to strengthen psychotherapies. Here, we focus specifically on how their ideas may apply to youth psychotherapy and idiographic treatment of youth mental health challenges.

Youth and adult psychotherapy have obvious similarities, but differ in ways relevant to Hayes and Hoffman's analysis: a) caregivers' involvement in accessing and participating in their children's treatment highlights the salience of caregiver support and "styles of family functioning", which Hayes and Hofmann identify as mediators of outcome; b) youths, unlike adults, often begin treatment at the behest of their caregivers and teachers, not for intrinsic reasons, and this can make motivational processes especially critical to success in youth therapy; c) youth developmental stage may impact the accessibility and efficacy of some therapeutic processes (e.g., recursive reasoning about one's own cognitions; regulation of attention and emotion through mindfulness and sense of self, prominent in some "third-wave" therapies).

These caveats notwithstanding, much of the authors' analysis is directly relevant to youth psychotherapy. For example, they stress that, although psychotherapy protocols have often outperformed comparison conditions, advances in efficacy to date have "been inhibited". This perfect-

ly characterizes the youth psychotherapy literature. In a recent meta-analysis[2], we synthesized findings of 453 randomized controlled trials of youth psychotherapies, spanning five decades. Across time, mean effect sizes have not changed significantly for treatment of anxiety and attention-deficit/hyperactivity disorder (ADHD), and have *declined* significantly for depression and conduct problems.

Those worrisome findings were complemented by an analysis of the potential for improvement of current psychotherapies[3]. Using a meta-analytic copula approach with 502 randomized trials, we predicted youth psychotherapy effect size as a function of therapy quality. Our results indicated that a currently available therapy of "perfect quality" would have an estimated effect size of Hedges' g=0.83, conferring (via common language effect size) a 63% chance – only 13% better than a coin-flip – that the average treated youth would improve more than the average control group youth. This suggests, consistent with Hayes and Hofmann, that truly major improvements in therapy benefit may require fundamental changes in our interventions.

But, aren't new and different therapies being designed every year? Yes, but the challenge has been to create new therapies that are not skeuomorphic – new in some respects but retaining unnecessary and potentially counterproductive features of their predecessors[4]. Optimizing advances may require both building on strong foundations and breaking the mold. Hayes and Hoffman wisely note the value of leveraging the strengths of existing therapies when innovating, making intervention development evolution, not revolution. We agree. The challenge may lie in striking the delicate balance between incorporating decades of evidence on what works, and shedding structures that are based in tradition or habit, rather than evidence.

Achieving the right balance could involve, as the authors suggest, focusing on change processes and making treatment more idiographic, less standardized. They suggest "moving away from treating psychiatry labels toward treating the individual patient by understanding the process-based complexity of his/her problems and applying tailored intervention strategies". Our efforts, and those of our colleagues, to apply such an approach in youth psychotherapy have led to the creation of treatments that are modular, transdiagnostic, and personalized using measurement-based care. In one version, called MATCH[5,6], 33 components (i.e., "modules") of evidence-based treatments for anxiety, depression, trauma, and conduct problems – all derived from decades of research by our predecessors – are organized into a menu of treatment options. Clinicians use this menu to design treatment idiographically, guided by decision tools and an individual dashboard showing each youth's treatment response, updated weekly. Although decades of research inform its content, MATCH departs from traditions such as treating just one psychiatric disorder and using a standardized sequence of sessions – potential skeuomorphs but, at a minimum, not features that research has shown to be essential for beneficial outcomes.

In a second step of idiographic design, we have organized youth psychotherapy around empirically supported principles of change, honoring ideas previously proposed by many leaders in the field[7]. The resulting FIRST protocol[8,9] synthesizes treatment procedures within five principles: calming and self-regulation, cognitive change, problem-solving, positive opposite behaviors (e.g., exposure, behavioral activation), and motivation for change. This principle-guided approach rests on the rationale that learning specific procedures is useful, but perhaps *most* useful to therapists who understand *why* they are using certain techniques – i.e., which change processes need to be set in motion to produce real benefit. In FIRST, as in MATCH, treatment is fully idiographic, with individualized intervention guided by clinician decision tools and repeated measurement of each youth's functioning and treatment response.

Early evidence on these idiographic approaches has been both encouraging and revealing, highlighting what youth psychotherapy research suggests may be three key challenges for process-based psychotherapy. One challenge is clinical decision-making. As treatments become less standardized and more idiographic, clinicians will be required to decide, for each youth, which processes to target, in which order and in which combinations, and with which specific procedures, given multiple options supported by evidence. A critical long-term task for intervention science will be developing strategies for guiding such decision-making, and determining the optimal blend of data-driven and clinician-guided judgment.

A closely-related challenge will involve enriching and deepening clinical assessment to capture the underlying processes that need attention in treatment – processes that may be key to therapeutic success. Our field has a long history of assessment focused on diagnosis and symptoms, and a respectable track record within some of the process dimensions identified by Hayes and Hofmann – for example, cognitive reappraisal, rumination, worry, and catastrophizing. However, the newer, deeper, contextually-focused processes identified by the authors – such as cognitive diffusion, flexibility, non-reactivity, and "healthy psychological distance from thought" – may well require new measures, and possibly entirely new assessment strategies.

A third challenge will be discerning the implications of process-based psychotherapy for what many consider the holy grail of intervention science: identifying mechanisms of change. There is a long history in our field, well-documented by Hayes and Hofmann, of efforts to elucidate mediators of therapeutic change. Documenting mediators is a statistical step toward identifying mechanisms that account for treatment benefit – the switches that, when flipped, make therapy successful.

An implicit assumption historically has been that we will eventually discover *the* mechanisms of change (or perhaps a small number of them) for treatment of each psychiatric disorder. A process-based analysis turns this thinking upside down in at least two ways: a) treatment focuses not on disorders but on underlying processes, and b) treatment is tailored to each individual, targeting complex underlying processes that matter for that individual. Under these conditions, do we continue the search for mechanisms of change and, if so, are we searching for "flip switches" as diverse and distinctive as the individuals our interventions are designed to support?

Taken together, there is much that intervention scientists – including those of us immersed in youth psychotherapy –

can learn from the perspective offered by Hayes and Hofmann. Clearly, exciting challenges lie ahead in process-based psychotherapy.

John R. Weisz[1], Olivia M. Fitzpatrick[1], Katherine Venturo-Conerly[1], Evelyn Cho[2]
[1]Department of Psychology, Harvard University, Cambridge, MA, USA; [2]Department of Psychological Sciences, University of Missouri, Columbia, MO, USA

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Trans-theoretical clinical models and the implementation of precision mental health care

Hayes and Hofmann's paper[1] provides a new framework to conceptualize psychological therapy as a process-based clinical intervention. The authors describe the history of cognitive behavioral therapy (CBT) in three waves and formulate the process-based orientation as the step beyond theoretical orientations. They outline a shift from protocols treating syndromes to idiographic approaches using process-based clinical strategies to adapt treatment to the complexity of patients' problems.

The main idea is to use knowledge derived from empirical findings on psychological change processes in CBT to tailor treatments to patients and include new evidence as it becomes available. Therefore, process-based therapy is presented as a conceptual framework open to new, empirically tested processes identified in international research on diverse samples and dedicated to the goal of evidence-based psychotherapy.

Overall, we welcome the development of process-based psychological therapy within the context of a larger trans-theoretical and integrative trend in clinical practice, training, and theory building. There is no general agreement on the conceptualization of psychological therapies, and clinical services differ largely between and within countries. Furthermore, treatment models are often combined intuitively in clinical practice. The task for psychotherapy research is to improve this clinical decision-making process by grounding it in empirical data[2].

Hayes and Hofmann observe that, despite the many theoretical developments, the practice of psychological therapies has not seen a large improvement in success rates over the last decade. This conclusion of outcome research is receiving increasing attention and acceptance in the field[2]. Therefore, it is no wonder that new modular and integrated concepts have emerged. The idea is to combine elements within or between different treatment orientations based on sound empirical data, with the goal of tailoring treatments to specific patient problems and needs[1-4].

Such trans-theoretical treatment concepts are complemented by recent trans-diagnostic psychopathology research – for example, the Research Domain Criteria, the multivariate Hierarchical Taxonomy of Psychopathology, and network models. Psychological disorders are no longer seen as categorical entities, but as elements of a multidimensional and transdiagnostic model of psychopathology.

Beyond Hayes and Hofmann, we argue for a trans-theoretical perspective facilitated by data-informed clinical practice, research and training, and focusing particularly on patients not profiting from psychological therapies. Some recent and ongoing research trends can be delineated in this respect[2]. These include the development of improved, standardized, freely available, and easy-to-apply measures; new efforts in replication; new statistical methods (e.g., machine learning) to analyze large cross-sectional as well as intensive longitudinal datasets; improved research on processes and mechanisms of change; a better dissemination and cross-cultural adaptation of interventions, including Internet services[5]; and a better implementation of outcome monitoring and clinical navigation systems to support therapists to identify and treat patients at risk for treatment failure.

We see the chance for psychotherapy to become characterized by trans-theoretical, personalized, and evidence-based clinical practice and training. Implementing continuous multidimensional assessments in routine care and identifying negative developments early in treatment are particularly crucial. Given that the knowledge about moderators and mediators in our field is limited, any treatment application needs to be evaluated by its actual progress for the individual patient[2].

This development has the potential to help the field mature and to empower clinical interventions. The goal could be to move away from concepts based on average differences and broad clinical assumptions that are difficult to operationalize, and towards concrete outcomes and studies on subgroups of patients not profiting from treatment.

In recent years, concepts from precision mental health research and precision medicine have been introduced, driving these advancements forward[6,7]. Rather than choosing between treatment protocols, the aim of these developments is to tailor treatment to individual patients using empirical data. Evidence-based personalization in clinical practice might be improved by combining research on treatment prediction and selection with research on digital feedback and the application of decision support systems[8].

At treatment onset, therapists are provided with prognostic information, for exam-