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Empirical vs. factorial validity in personality inventories: The MMPI-2 and the restructured RC scales

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Abstract ■ Since 2003, several American publications have appeared on “Restructured Clinical Scales RC”. These scales were constructed in contradiction with the empirical psychometric strategy adopted from the outset for the MMPI (1943) and MMPI-2 (1989). Rather, the RC scales are based on a theory-factor strategy, which long-time MMPI/MMPI-2 experts disavow because it does not fulfill its promise of validity. In 2003, the RC scales (Tellegen et al., 2003) were first arbitrarily grafted to the set of empirical MMPI-2 scales. Then, in 2008 (see Tellegen and Ben-Porath), they were instead integrated as an asset to a brand-new instrument based on factor analysis, called MMPI-2-RF on the sole basis of borrowing 338 of the 567 items of the MMPI-2. The background to this article is therefore the possible adulteration of the most important personality test used in forensic expertise and in clinical contexts. Our goal is to review both the psychometric foundations of the MMPI-2 and the value of these RC scales (Tellegen et al., 2003) in the now open confrontation with the MMPI-2.

Keywords ■ Empirical vs. theorical-factorial psychometric strategy; MMPI; MMPI-2; MMPI-2-RF; MMPI-3; Psychopathological clinical scales; Psychiatric diagnostic label versus identification marker; RC scales; MMPI-2 clinical scales covariation; Discrimination function analysis; Guttman facet theory..

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Introduction

In the abundant arsenal of psychometric tests and, particularly, tests known as "personality inventories", the Minnesota Multiphasic Personality Inventory (1943), then the MMPI-2, an updated version in 1989, occupies one of the top ranks thanks to a reputation established in the first half of the 20th century and to its recognized credibility in the clinical and psycho-legal fields. However, more recently, the authors of the *RC* (MMPI-2 Restructured Clinical) scales resolved to improve version 2 of the test, accusing the MMPI/MMPI-2 of "blind empiricism" (Tellegen et al., 2006). They attempted to justify their own theoretical-factorial approach (Tellegen et al., 2003) for new basic clinical *RC* scales to be integrated into the MMPI-2, an approach whose construction methodology deviates drastically from the traditional empirical methods which characterized in their very essence the MMPI and MMPI-2 inventories.

To situate the reader unfamiliar with these inventories, it should be noted that Hathaway and McKinley (1940, 1942) began to elaborate the original MMPI under the new banner of "empiricism" (see *Definitions / Clarifications* in the next section). The initial choice of a pool of items ($N = 504$) was made without any specific or explicit rationale. Ultimately only the final empirical validation of each item mattered, based on a criterion group as contrasted to a normal sample. After the relative failure of antecedent personality inventories, the construction of which was based on the criterion of face validity for each item, an essentially theoretical and subjective approach, the table was set for this new methodological position, radical for the time, explained by Meehl (1945b, 1945a) who stressed the danger of accepting items solely on the basis of their obvious content (see also Berg, 1959). This position collides head-on with the rational at the base of the *RC* scales. The success of the MMPI was dazzling, giving rise (still today) to unprecedented results in terms of research and clinical use (legal expertise, diagnostic indications, therapeutic guidelines). Sellbom and Ben-Porath (2006) report that MMPI/MMPI-2 has brought about more than 8,800 publications in peer-reviewed scientific journals, a feat unprece-

dented in this area.

The MMPI also used astute devices to detect the validity of the test based on the answers given by the subjects. Let us recall Hathaway's interest in lie detectors (Ruchenne, 2019).

Instead of using independent sets of tests, each with a particular purpose, Hathaway and McKinley (1940) gathered in a single test a large sample of behaviors for review by psychologists, including a wide range of items, where various scales emerged representing a variety of valid descriptions of personality (as present in the clinical mind of the time). Despite the original intention of the authors, the label "psychiatric diagnosis" (see *Definitions / Clarifications* in the next section) that they wanted to affix to clinical scales has proved to be ephemeral. Today, we would rather speak of "identifying labels". They are the empirical correlates, embodied in individual scales, pairs of scales and triads of scales, that have proved to be a solid basis for characterizing personality and behavior with reference to scale numbers, rather than referring explicitly to psychiatric diagnostic designations, these being ultimately outdated or moved away from psychiatric nomenclatures constantly evolving since the first DSM (*Diagnostic and Statistical Manual of Mental Disorders*; see American Psychiatric Association, 1952).

Definitions / Clarifications

Empirical psychometric strategy

MMPI's psychometric strategy known as "contrasted groups" (comparison of groups) enabled Hathaway, for the so-called psychopathological clinical scales (see below: *The assets of the MMPI-2*), to sift out discriminating items specific to each comparison of subpopulations (e.g., normal vs. depressed; normal vs. schizophrenic), and reassess these items by cross-validation. This psychometric strategy is called "practical utility validity" by Laurencelle (1998), or "meaningful measure" (i.e., allowing discrimination based on an external, objective criterion) by Caldwell (2006). For other scales (like content scales), these are rational-empirical procedures, but where part of the elaboration includes validation against a criterion.

Theoretical-factorial strategy

Referring here to the restructured clinical *RC* scales (Tellegen et al., 2003), Caldwell qualifies these as "maximum measure" (i.e., maximally expressing the value), notwithstanding that they fail the test of discriminant validity (diagnostic or identification), as will be seen in the following text. Laurencelle (1998) acknowledges the frailty of the concept of factor validity of self-reported data (e.g. as applied to Cattell's 16PF), based essentially on the obvious verbal content of test items.

Scales (or indices) of validity

The term "validity" here refers to the degree of confidence that the examiner may have that the examinee's test responses are representative of his/her personality. It therefore refers to the credibility or objective honesty of the answers (and not just the "sincerity") of the subject. Some scales (or indices) pertaining to validity bear on the inconsistency of responses, others on attitudes of minimization of psychopathology, others on the propensity to exaggerate one's psychopathology (see Parisien, 2014).

Content scales

The interpretation of the series of so-called "content scales" (see Butcher, Graham, Williams, & Ben-Porath, 1990; Ben-Porath & Sherwood, 1993; Graham, Ben-Porath, & McNulty, 1999) is based on the content of the items and on the empirical correlates present in the literature. Leary (1957; see Friedman et al., 2015) distinguished between two levels of clinical information in MMPI/MMPI-2, corresponding to clinical scales vs. content scales. Level I is about how persons are described by others or the interpersonal pressure that their symptoms, complaints, concerns, attitudes and character traits exert on them. These data are public and objective and they may or may not be consistent with the persons' view of themselves or of their situation. It is this aggregate portrait that is mirrored in the clinical profile of MMPI-2 or in scales whose validity is essentially based on an objective criterion, resting on the empirical strategy of contrasting groups. Level II is more concerned with conscious descriptions of a person's own phenomenological field, the relationship of his/her perceptions of self in terms of behavior, symptoms, traits and relationships with others. Content scales are particularly permeated by data falling under this level II. The rational-theoretical strategy underlying the *RC* scales is also consonant with the obvious content of the items.

MMPI vs. MMPI-2

Historical review: empirical psychometric strategy.

To understand the essential psychometric contribution of MMPI, the reader should know that, in the 1910s, the major motivation for constructing personality questionnaires was the need to assess the suitability of military personnel to serve in the armed forces during the First World War. Questionnaires were built on a rational basis. The problem encountered then was the lack of control over the attitude of the subject being assessed, in particular his inclination to suggest or exaggerate a personal problem in order to avoid enrollment.

The psychometric strategy of «contrasted groups» was first proposed by E. K. Strong for his "Strong Vocational Interests Blank" (SVIB: Strong, 1927). Strong had built his inventory by discriminating between various occupational groups, referring to their job categories, and the general male population. With respect to the MMPI, this method of contrasting groups appealed to the pragmatist S. R. Hathaway (see Ruchenne, 2019), who was wary of theories, preconceptions and ingenuous intuitions. Its use enabled him to pinpoint the discriminant items specific to each pair of sub-populations (e.g., depressive vs. normal) and to resubmit these items to a “cross-validation”, those not repeating their significant discriminant value being discarded.

The MMPI-2. Re-standardization with stability.

For the 1989 edition of the MMPI-2 (see Butcher et al., 2001), in a spirit of continuity with the original MMPI of 1943, there was no re-validation of the already existing clinical scales, neither the “basic” scales nor the “additional” ones (see Parisien, 1999, 2014). A number of 106 of the 566 MMPI items were set aside. From the original pool of items, 460 items were therefore retained, 68 of which were reformulated, and 89 new items were added for new content scales. Eighteen of the new items were rejected, empirical verifications leading to this decision. Thus, the MMPI-2 finally contains 567 items.

There has been but a minimal item pruning in the 13 basic scales (validity and clinical scales) as in some other scales, so that calculations made from the original scales and the revised scales produce scores roughly equivalent.

In 1999, Parisien wrote about Butcher’s conference in Montréal on May 18, 1989:

> Butcher has already asserted (Parisien, 1989) that two major reasons militated in favor of renormalizing the MMPI: 1. The likely vulnerability of the psycho-legal court expert using 50-year-old standards;[1] 2. The non-comparability of the results from one scale to another because of the disparate individual distributions of the raw data (in terms of skewness and kurtosis) giving rise, from one scale to another, to different percentile ranks on the same linear T normative scale.[2] (translated from French)

The assets of the MMPI-2

Nichols (2011) tells us that the major strength of MMPI-2 lies in its essential continuity with MMPI. From instrument to instrument, there were only minor changes while similarities are dominating; more particularly the empirical strategies of MMPI are applied for MMPI-2.

Let us remember that in the years 1935-1940, the individuals in the MMPI criteria groups who served to construct the eight so-called psychopathological clinical scales (see Table 1, below) were not grouped on the basis of precise psychopathological diagnoses. The DSM-I handbook (*American Psychiatric Association*) was to appear a decade later, in 1952. Rather, the targeted groups were gathered on the basis of common traits or symptoms as judged by the authors and university hospital psychiatric staff. That is why it is advisable to refer to clinical scales by their number rather than by name (e.g., scale **8** instead of "Schizophrenia scale”). In fact, for MMPI-2, constructing a completely new set of core clinical scales would have presented a high risk to the preservation of the laboriously constructed links between the original clinical scales and these correlates. Moreover, despite their imperfections, the properties of the basic clinical scales are well known. Since the 1940s, the maintenance of criteria groups has helped to create a precious fund of empirical correlates and has sheltered them from their early interpretation based on the original diagnostic concepts. This protection applies to MMPI-2 as well as to MMPI, since the new standards of the normal MMPI-2 sample from 1989 were surprisingly close to those of the 1943 MMPI (see Greene, 1991; Parisien, 1989).

Nichols (2011) lists the benefits of MMPI-2, including:

- a temporal stability of the basic clinical scales, neither too low nor too high, true to both the characteristics of continuity and change in an individual’s personality and symptoms;
- high convergent validity, demonstrated in a large number of studies, and modest but consistent predictive validity;
- an ability to assess a very wide range of attitudes, traits and behaviors in both normal and non-normal populations;
- the availability of several measures which, when combined, allow a relatively precise specification of the attitude adopted by the subject during the testing period and of the credibility of his responses;
- the availability of several interpretive procedures that focus either on individual scales, profile patterns or item content, each offering controls and potential elaborations incident on the other scales.

On the other hand, the MMPI-2 also has weak points. In particular, there is significant item overlap between clinical scales, increasing their intercorrelations and potentially reducing their respective discriminant validity.

[1] Surprisingly, the new MMPI-2 standards turned out to be quite close to those of the MMPI.

[2] This concerns the eight psychopathological scales **1**, **2**, **3**, **4**, **6**, 7, **8**, and **9**. In order to maintain continuity with the MMPI standards, a minimally invasive transformation of the raw scores has been developed, via uniform T rescaling. This procedure is explained in Greene (2000,2011).

Helmes and Reddon (1993) attribute the structural problems of MMPI/MMPI-2 to a redundancy among clinical and other scales due to an associated item overlap. This problem of item overlap is not to be ignored: in clinical samples, the mean cross-correlation between basic clinical scales lies between 0.55 and 0.60 (Nichols, 2011). Helmes and Reddon (1993) indicated that this impoverishes the scales' discriminant validity as well as undermines the factorial structure of the test. Of course, the sensitivity of these scales is increased, but to the detriment of their specificity. The overlap was one of the major reasons cited by the authors of the *RC* scales for undertaking their attempt to overhaul drastically the main clinical scales of MMPI-2.

The RC *scales inserted in the MMPI-2 in 2003: A breaking with the empirical psychometric strategy*

One of the most consequential reforms of the MMPI-2 of 1989 came with the addition in 2003 of the *RC* (Restructured Clinical Scales) in the 'MMPI-2 Extended Score Report of the computerized correction service NCS-Pearson Assessments': these *RC* scales, although psychometrically foreign to all MMPI/MMPI-2 contents, were now part of the standard MMPI-2 protocol. In the 1990s, Tellegen (along with other authors of MMPI-2, including Ben-Porath and Graham, but without Butcher) started a project that culminated in the early 2000s (Tellegen et al., 2003) in a series of eight restructured clinical *RC* scales, constructed through a factor analytic strategy that deviates clearly from the empirical tradition underlying the clinical scales of MMPI / MMPI-2. One of the goals announced (but not met) by Tellegen's group was to address the significant item overlap among clinical scales. They therefore began by identifying the items shared by clinical scales, items whose grouping finally gave rise to a measure of general maladjustment (or subjective distress), evoking factor 1 of the MMPI/MMPI-2 item pool (therefore equivalent of the **A** scale, or Anxiety, of Welsh, 1956). This became the factor *dem* of the *RC* scale group (see Table 1), or *Demoralization* (*RCd*). The identification of the *RCd* items corresponded to the cleaning up of the eight clinical scales of the MMPI-2 renamed thereafter *RC1* to *RC4*, and *RC6* to *RC9*, i.e. purifying these by discerning ('capturing') the "distinctive definitional core" (or distinctive substantive core) of each of the eight older clinical psychopathological scales (1, 2, 3, 4, 6, 7, 8, & 9) of MMPI/MMPI-2 (Nichols, 2011). Table 1 shows the correspondence between the *RC* scales and the clinical MMPI/MMPI-2 scales.

The reader is reminded that, among the reasons for the overlap of items on the clinical scales, two are predominant:

The overlap of symptoms among psychiatric syndromes. This overlap increases the sensitivity of the scales, while decreasing the specificity of each (Friedman, Gleser, Smeltzer, Wakefield, & Schwartz, 1983);

The common variance with the 1st factor. Factor analyzes of the MMPI scales, subsequent to the test's release in 1943, consistently identified two factors that have been named and interpreted in various ways. Welsh (1956) constructed two scales to represent and measure these factors, namely factor 1 (scale **A**: Anxiety) and factor 2 (scale **R**: Repression) (see Greene, 2011). Factor 1, the main source of covariation between MMPI/MMPI-2 items, is associated with a large and non-specific general maladjustment of the person, or with a dimension of subjective distress. It reappears in various places, for example in the **A** scale (Anxiety: Welsh, 1956), or on the *RCd*/*dem* factor (Demoralization: Tellegen et al., 2003). It is pervasive in almost all test items and inflates the intercorrelations between most scales, as already mentioned.

It is with reference to this context that the restructured *RC* scales project was undertaken with the intention of creating a series of scales that better reflect the "conceptually meaningful and clinically important constructs" (Tellegen et al., 2003) present in the original clinical scales. Thus, "the *RC* scales were designed to preserve the important descriptive properties of the existing clinical scales of MMPI-2, enhancing their distinctiveness" (ibid.).

Butcher (2011) criticized the strategy used for creating *RC* scales, in particular the abandonment by Tellegen et al. (2003) of the empirical construction method on which the MMPI/MMPI-2 was based. In this regard, Caldwell (2006) noted that the difference between the scales extracted by factor analysis (the *RC* scales) and the scales established empirically by the contrast group vs. normal population method (pertaining to the psychopathological clinical scales of MMPI/MMPI-2) lies in what he calls "maximum measure" (i.e., to measure something very well) vs. "significant measure" (i.e., to discriminate on the basis of a criterion). Similarly, Laurencelle (1998, chapter 3) mentions the 16PF and MMPI tests to respectively illustrate the "theoretical validity" vs. the "practical usefulness" of a test, the fragility of the theoretical concept of factor validity (as traditionally demonstrated by and pertaining to Cattell's 16PF) being currently questioned (André, Loye, & Laurencelle, 2015). The naïveté of the concepts resulting from classical factorial analysis is mainly due to the fact that these concepts are based on an interested and biased reading and interpretation of the items by the examinee, inducing him to report his way of seeing himself or to transmit an image that he wants others to have of him. This is the inherent flaw in self-reported description and testing. In the 1940s, Hathaway (see Hathaway & McKinley, 1943) was acutely aware of this (see Ruchenne, 2019), hence his use of the empirical strategies described in this article as well as

Table 1 ■ Correspondence between *RC* scales and psychopathological clinical scales

RC SCALES	PSYCHOPATHOLOGICAL CLINICAL SCALES
Dem factor (*RCd* scale: Demoralization) of *RC* scales	Factor 1 (**A** scale: Anxiety) of MMPI/MMPI-2
RC1/som (Somatic Complaints)	**1**/Hs (Hypochondriasis)
RC2/ipe (Low Positive Emotions)	**2**/D (Depression)
RC3/cyn (Cynicism)	**3**/Hy (Hysteria)
RC4/abs (Antisocial Behavior)	**4**/Pd (Psychopathic Deviate)
RC6/per (Ideas of Persecutions)	**6**/Pa (Paranoia)
RC7/dne (Dysfunctional Negative Emotions)	**7**/Pt (Psychasthenia)
RC8/abx (Aberrant Experiences)	**8**/Sc (Schizophrenia)
RC9/hpm (Hypomanic Activation)	**9**/Ma (Hypomania)

the introduction of indices and scales of validity and credibility of responses.

Origins of RC *scales*

It is essential here to understand the origins and development of the restructured *RC* scales, considering our intention to demonstrate that, from the start, the authors Tellegen et al. (2003) got it wrong. In 1985, Watson and Tellegen sought to define a "consensual concept of mood" and, for so doing, they advocated a theory of two systems of general activation of affect, represented by the dimensional configuration PA (positive affect) vs. NA (negative affect): see Watson and Tellegen (1985), Tellegen, Watson, and Clark (1999), D. Watson, Wiese, Vaidya, and Tellegen (1999). This configuration was based on a factorial model of the structure of affect and applied to self-assessed mood. They developed a so-called hierarchical three-level model to describe the structure of the affect felt.

In 2003, the authors of the restructured *RC* scales (Tellegen et al., 2003) used the Watson-Tellegen model framework to shape and clarify the concept of 'demoralization' – (i.e., the basis of the scale *RCd* / *dem*) – in order to identify the source of the problematic covariation between the clinical scales of the MMPI-2. For the authors, the PU dimension (Pleasant vs. Unpleasant), which is located at the top of their hierarchy, would account for this covariation. What is more, according to them, the PU dimension is omnipresent in other self-reported clinical inventories. It was on this assumption that the authors of the *RC* scales extracted the demoralization dimension from the clinical scales of the MMPI-2 and confined it to their own *RCd* scale, then creating a set of eight purified *RC* scales that would be more conceptually distinct.

The uninformed clinician might assume that the hierarchical model of Watson and Tellegen is universally accepted and applied where a model of affect structure is needed. However, it is not. There is a number of other, competing models (Larsen & Diener, 1992; Russell, 1980; Thayer, 1996), widely validated and more important than the 'hierarchical' one, models (e.g., Russell's circumplex model) which also describe the structure of affect. Watson and Tellegen's model has been vigorously challenged since 1985. Following several studies and debates in the late 1990s, many shortcomings of the hierarchical model have been highlighted (see Carroll, Yik, Russell, & Feldman-Barrett, 1999; Green, Salovey, & Truax, 1999; Ranson, Nichols, Rouse, & Harrington, 2009).

Development of RC *scales*

From the start, the authors' allegiance to their hierarchical theory of affect seems to have stifled their curiosity for simpler modes of resolution to reduce the intercorrelations among the psychopathological clinical scales of MMPI-2 or to define the basis of the covariance of the MMPI-2 factor 1 using empirically validated benchmarks. Their construction method has thus been biased in favor of an unnecessarily dogmatic approach, excluding the exploration of empirical methods that would have maintained the methodological tradition of MMPI/MMPI-2.

In chapter 3 (Developing the Restructured Clinical Scales) of the manual edited by Pearson Assessments (Tellegen et al., 2003), the authors describe the specific steps followed for the construction of *RC* scales, which should enlighten the reader on the methodological bases of the creation of *RC* scales.

Step 1: RCd *scale ('capturing' Demoralization)*

The authors identified a subset of items to measure Factor 1 and create a new scale, called Demoralization, for embodying those items. This process was inspired by the hierarchical model of Watson-Tellegen, according to which the variance of the 1st factor of MMPI/MMPI-2 corresponded to the PU (Pleasant vs. Unpleasant) dimension of that model.

To create the items for the Demoralization scale (*dem*: $N = 23$ items), the authors first combined items of the scales that they considered to be most saturated with the

PU dimension, namely scales **2** (Depression) and **7** (Psychasthenia). They then performed various correlational analyzes in order to reduce the content of the scale to essentials, ultimately retaining 10 items. Thirteen other items were drawn from the rest of the item pool on the basis of their correlations with the factors of the Watson-Tellegen model, namely PEM (*Positive Emotionality*) and NEM (*Negative Emotionality*).

Step 2: basic components (identifying the "core" components of each clinical scales)

The authors attempted to eliminate from each of the psychopathological clinical scales of MMPI-2 the covariance it had with the factor *dem*, again using sophisticated correlational and factorial techniques. They thus defined a dimension that would supposedly reflect a "definitional core" for each scale and would be distinct from the *Demoralization* scale (although it remained correlated with it) as well as from the core components identified in other MMPI-2 clinical scales.

Step 3: starting scales (deriving the restructured clinical seed scales)

The authors selected 158 items from the original clinical scales as material to form new versions of the scales, which were then re-selected to reduce inter-scale overlap and increase intra-scale consistency. Based on the remaining items, a second set of scales was formed to which said items were added or removed to increase the distinctiveness (associated with the "definitional core") of each scale. The 73 items surviving these procedures were then sorted into a final set of starting, 'seed' scales, giving the scales *RC1*, *RC2*, *RC3*, *RC4*, *RC6*, *RC7*, *RC8* and *RC9*.

Step 4: final* RC *scales (enriched with items from the entire MMPI-2 booklet)

The seed scales were finally increased with items taken from the MMPI-2 item pool. In short, an item was added to a seed scale if it demonstrated good convergence with that scale at the same time as having weak correlations with the other scales: these procedures resulted in the final *RC* scales.

Review of *RC* scales

Still in the perspective of gauging the value and practical utility of the restructured *RC* scales, resulting from factorial psychometric strategies, we now turn to four groups of criticisms brought by various experts of the MMPI-2, their common standpoint being the superior value of the clinical scales empirical studies of MMPI / MMPI-2.

Criticisms 1: "maximum" measure vs. "significant" measure. We will first take up what Caldwell (2006) brought up as basic criticisms of restructured *RC* scales in volume 87 (2) of the Journal of Psychological Assessment, the journal having published 11 articles devoted to the restructured *RC* scales of MMPI-2, including that of Caldwell.

1. Caldwell mentions that the task of expurgating the Demoralization aspect (either toward factor 1 or scale **A**) from the eight clinical psychopathological scales (**1**, **2**, **3**, **4**, **6**, 7, **8**, and **9**) did not perform well, in view of the persistent correlations between the *RC* scales and independent measures representing this factor 1;
2. he writes that the goal of achieving a "maximal measurement" does not seem realistic;
3. according to him, this tentative expurgation attempted by the authors of the *RC* scales disregards the complexity and richness of the basic clinical scales of the MMPI/MMPI-2, whereas the empirical scales validated on group-criteria, such as those of MMPI/MMPI-2, lead to a "meaningful measure" of individual characteristics which come close to the criterion group from which these scales originate;
4. the interpretation of the *RC* scales is only based on the face validity of the items that compose them. However, the assumption that self-perception and self-description usually lead to valid results can be misleading or even fallacious, considering the objectives of assessment and intervention;
5. there is a glaring disparity between the narrowness of the interpretive specificity of the *RC* scales on the one hand and the extent (as well as the surprising specificity) characteristic of the research concerning the codetypes of the MMPI (Hathaway & McKinley, 1943) and of the MMPI-2 (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989) on the other. In MMPI-2, a codetype corresponds to the identification numbers of the two scales whose T scores (of mean 50 and standard deviation 10) exceed 65 at the basic clinical profile. The first number represents the highest scale, each scale being coded by a number (see table 1). For example, codetype **6-3** represents the **Pa** and **Hy** scales. It is precisely these different codetypes that were subsequently empirically established, allowing the sustained accumulation of numerous behavioral correlates.

Criticisms 2: allegiance to a theoretical rather than empirical approach. The problems undermining the *RC* scales come from the first step, namely the development of the *RCd* Demoralization scale, for which the authors sought to construct a control-scale, a "marker" measuring "the large emotionally colored dimension, captured for example by the well-known **A** scale of Welsh (1956, 2000), sometimes called "MMPI-2 first factor" (Tellegen et al., 2003). Rejecting the empiricism that guided the pioneers of MMPI, they needed a theoretical context applicable to the con-

struction of this "marker", which they interpreted as equivalent to the Pleasantness vs. Unpleasantness axis of the hierarchical model of positive affect vs. negative affect by Watson and Tellegen (1985), and which they called Demoralization (*dem*).

There were other options for conceptualizing and building an empirically modified "marker", options that would stand up to the Demoralization factor. These options are elaborated in Ranson et al. (2009):

1. the Welsh (1956) **A** (Anxiety) scale already contained in the MMPI-2;
2. more recent factor analyses carried out on all the items of the MMPI-2 and identifying a factor: first, Johnson, Null, Butcher, and Johnson (1984), with a factor they named JB1, the letters JB representing two authors of the article, then Waller (1999), with a factor called W1, likewise named;
3. a more than obvious option available to the authors of the *RC* scales (Tellegen et al., 2003) would have been to factor their own data!

None of these options seems to have appealed to the authors of the scales. On the contrary, it seems that it was a steadfast allegiance to a theoretical (rather than empirical) approach that guided these authors, a theoretical approach that imposed them with a bias and drove them away from their initial objectives.

First, the procedures to construct the *dem* concept/scale sorted out and retained items that are not found on any of the clinical scales of the MMPI-2. Indeed, these off-scale items represent almost half the size of the *dem* scale (see Ranson et al., 2009). Thus, the aspiration to target the most relevant source of the covariation between the clinical scales of MMPI-2 was abandoned.

Second, the decision to adopt the theoretical concept of demoralization marked a departure from the empirical tradition of MMPI/MMPI-2, in the same way that the adoption of a factorial procedure for researching the concept of demoralization did, a concept that, as the restructuring procedures progressed, exerted a biasing influence on what emerged as the 'distinctive fundamental core' of each clinical scale.

Criticisms 3: questionings raised in 1978 but avoided in 2003. Rules for including new scales in MMPI had already been issued ten years before the publication of MMPI-2 (see Butcher & Tellegen, 1978).[3] It was then agreed that only new scales that produce more accurate and valid results, or those that assess concepts not measured by existing scales, would meet the inclusion criteria. Several researchers (see for example Butcher, Graham, & Ben-Porath, 1995) have indicated the importance of comparing the new MMPI-2/MMPI-A scales to all existing scales accepted and already serving as standards.[4] However, the inclusion of the *RC* scales in the MMPI-2 in 2003 raised questions, in particular regarding the following aspects: redundancy, conceptual drift and sensitivity (see particularly Friedman et al., 2015, and Butcher et al., 2015).

Redundancy

It was found (Rouse, Greene, Butcher, Nichols, & Williams, 2008) that each of the *RC* scales is more strongly correlated to MMPI-2, either with an additional scale, or with a content scale, or with one of the **PSY-5** scales,[5] than with its parent clinical scale: here is a first redundancy. And yet, a large number of *RC* scales (*RCd*, *RC1*, *RC3*, *RC7*, *RC8* and *RC9*) also remain redundant with existing MMPI-2 clinical scales due to the relatively high correlations they show with these scales (but not as high as with some content or other scales of MMPI-2). Faced with the efforts of Tellegen, Ben-Porath, and Sellbom (2009) to rationalize, Greene, Rouse, Butcher, Nichols, and Williams (2009) presented a response in which they once more highlighted the relatively high correlations of several *RC* scales with existing MMPI-2 scales, noting that the MMPI-2-RF technical manual (Tellegen & Ben-Porath, 2011) also shows the same high correlations, as noted by Rouse et al. (2008).[6] The *RC* scales, whose authors praised their special originality and procedural newness, finally appear to suffer from the same deficiencies that were addressed to their elder competitors.

It can also be seen that the highest r correlations[7] between the *RC* scales and those of the MMPI-2 emanate in the latter instrument from scales of items set up with obvious content: either content scales, or some additional scales, either **PSY-5** scales derived from factor analyzes, or even a particular clinical scale without subtle items content (**Hs** scale not corrected by **K**); for information on the **K**-scale and the **K**-correction, see below, section *Sensitivity*.

[3] This second author, Tellegen, would later prove to be the primary author of the restructured *RC* scales (see Tellegen et al., 2003).

[4] The MMPI-A was developed for 14-18 years old (see Butcher et al., 1992).

[5] The Personality Psychopathology Five (**PSY-5**) scales represent a dimensional approach based on a factorial strategy (see Harkness, McNulty, & Ben-Porath, 1995). They are called: 1. Aggressiveness (AGGR); 2. Psychoticism (PSYC); 3. Disconstraint (DISC); 4. Negative Emotionality/Neuroticism (NEGE); 5. Introversion/Low Positive Emotionality (INTR).

[6] MMPI-2-RF (Tellegen & Ben-Porath, 2011) is a so-called restructured form of MMPI-2, i.e., a self-assessment measure of 338 items including 51 new and revised validity and clinical scales, with the clinical restructuring scales (*RC*) as a basis. It was developed with support from the University of Minnesota Press (copyright holder of MMPI-2), following the publication of the *RC* Scales (2003).

[7] These Pearson r coefficients are to be found in Greene (2011) and in Friedman, Bolinskey, Levak, and Nichols (2015).

Construct drift

Nichols (2006b) uses the term "construct drift" to refer to the possibility that the addition of items correlated with seed items (i.e., step 4 of the creation of *RC* scales: see above, *Development of* RC *scales*) incurs a conceptual drift in dissension with the starting core. The *RC3*, *RC4*, *RC7* and *RC9* scales are concerned here.

First (see Butcher, Hamilton, Rouse, & Cumela, 2006; Nichols, 2006b), the *RC3* scale would have been essentially (and intentionally) modified to the point of becoming a totally different scale from the clinical psychopathological scale **Hy(3)** MMPI-2 (see Table 1 in this text). Butcher (2011) noted that the rich descriptors as well as the code-types associated with the clinical scale **3** have become obsolete with the *RC3* scale, which is now redundant with the scales or subscales of the MMPI- 2, **CYN/CYN1** (**CYN** = “Cynicism” content scale, **CYN1** = “Misanthropic beliefs” content subscale). Thomas and Youngjohn (2009) further noted that the *RC3* scale has lost its usefulness as a benchmark for somatization in traumatic brain injury patients. In short, on the *RC3* scale, in comparison with the **Hy(3)** scale, the measurement of the expression of somatic symptoms disappears altogether, along with the elements of "demoralization". The *RC3* scale has become a scale opposed to the concept of naivety typical of hysteria, to be identified instead with cynicism (Gordon, 2006).

The *RC4* scale has been the subject of concern (Nichols, 2006b; Bolinskey & Nichols, 2011) because the high proportion of items relating to drug addiction that enter it presents a risk of false positive inferences with regard to broad anti-social dispositions and behavior.

Finally, Bolinskey and Nichols (2011) asserted that the *RC7* and *RC9* scales do not measure the same traits and behaviors as the original scales. They offer warnings to clinicians regarding the interpretations suggested by the authors of the *RC* scales.

Sensitivity

Homogeneous scales with only items with obvious content, that is to say, recognizable as to their psychopathological or problematic link, – for example the series of content scales of the MMPI-2 as well as the restructured *RC* scales –, are more vulnerable to attitudes of psychopathological "minimization" or "exaggeration" than are complex multifacetted clinical scales, e.g., the vast majority of MMPI-2 psychopathological clinical scales. The presence in a clinical scale of both obvious and subtle items constitutes a relative bulwark, a precaution against dishonest or misguided subjects presenting, willingly or not, a false portrait of themselves. This explains why studies using a variety of samples have revealed that the *RC* scales show lower score levels than the clinical scales of the MMPI-2, they being more prone to false negatives (associated with attitudes of minimization or lack of introspection).

It is the authors of the Wiener and Harmon clinical subscales who identified 146 obvious items and 110 subtle items for five of the clinical scales, namely: **2(D)**, **3(Hy)**, **4(Pd)**, **6(Pa)**, and **9(Ma)** (Wiener, 1948). The three other scales, namely **1(Hs)**, **7(Pt)**, and **8(Sc)**, do not include subtle items, which makes these scales choice candidates for attitudes of "minimization" or “exaggeration” (see Greene, 1991, 2000, 2011). It is therefore no chance coincidence that, in the profiles corrected by **K**, a score of credibility of the responses, it is these three scales (**Hs.5K, Pt1K, Sc1K**) that benefit from the largest score upgrade with **K**-correction. The **K**-correction in MMPI and MMPI-2 corresponds to a proportion of raw **K** scores added to certain clinical scales to compensate for the simulation bias, which varies as a function of the empirical data obtained at each scale.[8] The standards also provide a “non-**K**-correction” profile plotting option.

Furthermore, Wallace and Liljequist (2005) reported that the average T scores of clinical patients on the *RC* scales were significantly lower than the T scores of the original clinical scales of MMPI-2. Moreover, the majority of *RC* profiles (56%) presented fewer elevations (i.e. $X \geq 65$) than the original clinical scales (see MMPI-2).

In a large sample ($N > 2000$) of incarcerated criminals, Megargee (2006) found that all *RC* scales had mean T-scores below 56, which was also the case for *RC4* (Antisocial Behavior), and their grand mean sit below 50, the normative mean imposed on the MMPI-2 re-standardization sample. This also happens for the *RC4* scale , where one would expect a significantly high mean result among inmates.

Pizitz and McCullaugh (2011), in a sample of convicted male stalkers, indicate that five *RC* scales (*RC2*, *RC3*, *RC7*, *RC8* and *RC9*) had an average T score lower than 50, the population average. In the case of *RC4* (antisocial behavior), a scale one would expect to be high in such a population, the mean score was only 51.7, lower by more than a standard deviation compared to the score obtained by these men on the clinical scale **4** (**Pd**) of the MMPI-2.

In a study on child custody litigation (Archer, Hagan, Mason, Handel, & Archer, 2012), with a sample of subjects a priori nonclinical but naturally prone to minimization, most mean scores on the *RC* scales were below a T score of 50, with one exception: *RC6* with a T of 51.16.

In addition, Gordon, Stoffey, and Perkins (2013) conducted an empirical study comparing the sensitivity of *RC*

[8] This value proportional to the **K** scale score is simply added to the indicated scale score, e.g., the raw score **XHs** of the **Hs** scale becomes $\mathbf{X}_{\mathbf{Hs}} + {}^{1}/_{2}\mathbf{X}_{\mathbf{K}}$.

scales for the detection of mental health problems in a sample of clinical patients. The results revealed that most of the MMPI-2 clinical scales had a higher sensitivity than the *RC* scales at all levels of psychopathology, and in particular at lower pathological levels. The authors also verified that the differences obtained were not ascribable to the use of the **K**-correction of MMPI-2.

Saborio & Hass (2012; see Butcher et al., 2015) conducted a study using MMPI-2 on 167 sexually abused women. They found very important differences between the clinical scales of the MMPI-2 and the *RC* scales, the latter scoring at a normal level (T $\approx$ 50) except for the demoralization factor *RCd* (T $= 65$). However, these victims presented serious mental health problems: symptoms and behaviors consistent with the information provided during clinical interviews. The authors confirm that the results on the clinical scales of MMPI-2 also reflected the psychological problems reported.

A more advertised example concerns the serial killer Theodore Kaczynski, nicknamed Unabomber, doctor (Ph.D.) in mathematics from the University of Michigan in 1967. He was a professor at the University of California for two years before living as a recluse in the forest in Montana, harboring anti-government and anti-technology delusional beliefs. For a number of years, he mailed homemade bombs to universities and to the American Airlines company. Thus, he killed 3 persons and injured 23 more. In 1998, he denied having mental problems. During the legal proceedings against him, he attempted to commit suicide. He was found guilty of murder and received a life sentence. While incarcerated, he underwent a psychological assessment including MMPI-2 (see Hyman, Caldwell, & Nichols, 2013). The comparison between the profile of the clinical scales of the MMPI-2 and that of the *RC* scales provides remarkable insights into the validity of these two types of profile.

1. The profile of the psychopathological clinical scales of MMPI-2 is characteristic of a pattern of long-lasting psychological maladjustment. Scales **4(Pd)** and **6(Pa)** both dominate the profile, just above the threshold of 65. Scale **2(D)** is at a T score of 64, just below the threshold. Scales **1(Hs)**, **7(Pt)** and **8(Sc)** approach the T score of 60. Scale **3(Hy)** has a T score of 50, and scale **9(Ma)** has a T very close to 30. This codetype **4-6** suggests a paranoid personality disorder. It corresponds to the results of previous research on serial killers (Craig, 2008; Nichols, 2006a).
2. By comparison, the profile on the *RC* scales shows a single significant peak, i.e., $T = 75$, at *RC2* (Low Positive Emotions), suggesting a dysphoric anhedonia of low to moderate intensity. The *RC1* scale has a T score of 60. The other seven *RC* scales (including *RC4* and *RC6*) show a T score under 50 (except for *RC3*, which is 50). The *RC* scales therefore did not detect a severe mental health state nor behavioral problems that appear in the profile of the MMPI-2 clinical scales (codetype **4-6**), and which manifested themselves in the subject's life by a significant disorder of paranoid thinking as well as a high potential for acting out and a twisted belief system. This lack of sensitivity of the *RC* scales to psychopathology is to be added to other similar indications in the clinical literature, which constitutes a real handicap in the clinical field and a critical one in the psycho-legal context.

Butcher, Hass, Greene, and Nelson (2015) point to two sources of insensitivity of the *RC* scales. First, the eight restructured *RC* scales contain substantially fewer items than the eight psychopathological clinical scales of the MMPI-2 (168 vs. 411 items), a loss of information that brings with it a substantial loss of score reliability.[9] Next, these clinical scales are heterogeneous measures comprising several different types of item content. For the MMPI-2 clinical scales, by contrast, items were retained because they predicted external behavior, and not because they showed to be congruent with other items on the same scale. Poor internal consistency does not necessarily preclude good prediction of mental health problems. Or, from a statistical viewpoint, items on a particular scale do not have to concur to a single factor to be useful in prediction. In comparison, the construction of the *RC* scales was dictated by a strategy that focused on unitary or simple dimensions rather than being guided by a concern for behavioral prediction.

Louis Guttman's "facet theory" (Guttman, 1954; Guttman & Greenbaum, 1998) lends us a way and a language to reframe the above argument. A facet is a single piece of content, while a psychometric concept (or construct) is a collection of two or more facets, which may be statistically independent of each other according to Guttman. A very high scale intra-correlation (or "internal consistency") only indicates that the included facets with their correlated information are very present, and their common information content strengthened. The question arises: is someone's behavior determined by only one simple concept (as mirrored by its correlated information sources), does it depend on only one factor?

Rather, the empirical approach (by hooking test items on identified typical groups) allows to capture the complex configuration of facets, whether they are interdependent or not, the configuration that best represents the targeted psychopathological type and that is also the most

[9] A score reliability (and measurement accuracy) of 0.80 of an average $N = 51$ items scale ($\approx$ 411 items / 8 scales) would melt down to about 0.62 after suffering an item loss quotient of 60% (with $168/8 \approx 21$ items), as verified with Spearman-Brown's "prophecy formula" (Laurencelle, 1998).

likely to trigger or reveal the psychopathology. The "facets" or items included are not necessarily correlated nor obviously compatible. This heuristic contribution by Guttman certainly constitutes a strong argument in favor of the empirical approach, based on observed clinical reality rather than resting solely on the conceptual-theoretical factorial strategy. For Friedman et al. (2015), the causes of the demonstrated lack of sensitivity of *RC* scales are not difficult to find. Similarly to the MMPI-2 content scales, most of the items on the *RC* scales have obvious contents, which are easy to spot when one wants to present a fictitious and advantageous portrait of oneself. What is more, the key item responses (or significant responses to problems) are on the TRUE side for the vast majority (297/366 or 81%) of the items of the 15 content scales of the MMPI-2, and for 126/168 (75%) of the 8 *RC* scales. This unbalanced pattern of item arrangement makes it easier for the subject to "minimize" the psychopathology, by avoiding the TRUE response. This fallacious strategy turns out to be less effective on the psychopathological clinical scales of the MMPI-2, since the key response is TRUE for 228/411 items or 55%, a much more balanced arrangement.

Criticisms 4: False importance of "contemporary" concepts of demoralization and anhedonia. The authors of the *RC* scales (Tellegen et al., 2003) pursued a second objective of "growth change", subsidiary this one since stated in 2006 in response to Rogers et al., 2006 (see Tellegen et al., 2006). This objective aims to relate MMPI-2 directly to contemporary conceptions of psychopathology. The authors of the *RC* scales therefore seek to formulate their efforts as attempts to modernize MMPI-2, by bringing it up to date, in keeping with more recent conceptions (models, knowledge) of personality and psychopathology. Their reasoning is this: if the interpretive guidelines focus almost only on tracks of empirical correlates and do not provide and forcefully graft conceptual organizational principles, the MMPI-2 will be kept out of the mainstream of current personality and psychopathology thinking; it will be increasingly disconnected from conceptual developments in the field. Faced with this prophesied failure of the MMPI-2, the *RC* scales therefore appeared to be a welcome remedy.

To this argument, Ranson et al. (2009) respond that these so-called contemporary conceptions of personality and psychopathology do not exist outside the affect model of Watson and Tellegen. And, for *RC* scales to act as a bulwark against the alleged obsolescence of MMPI-2, the said model would need to be widely accepted, whereas it is not. In sum, *RC* scales are just another set of one-dimensional scales of obvious content with no particular contemporary relevance. The two supposedly new concepts advocated by the authors of the *RC* scales, demoralization and anhedonia, therefore have neither the scope nor the significance they suggest for the prophesied downgrading of MMPI-2.

Demoralization

The authors of the *RC* scales specified that demoralization is essentially an alternate label for the PU (Pleasantness vs. Unpleasantness) pole that sits at the top of Watson and Tellegen's hierarchical model of affect. They emphasized its theoretical and conceptual specificity. Yet, its application to the field of personality and general psychopathology is uncertain and has been challenged (Ranson et al., 2009). Tellegen et al. (2006) attempt to bridge the gap with certain authors (Frank & Frank, 1991; Joiner, Walker, Pettit, Perez, & Cukrowicz, 2005) who have used the same label demoralization. But there is no evidence that these authors are even aware of the existence of Watson and Tellegen's hierarchical affect model. In Frank and Frank (1991), for instance, demoralization corresponds to a very broad psychopathological concept used to indicate the psychological state shared in all psychotherapies and which leads the patient to seek psychotherapeutic help, regardless of his specific emotional state. The attempt to bridge the gap with authors who have used the same word demoralization therefore seems fictitious.

Anhedonia

The authors of the *RC* scales consider anhedonia as an interchangeable construct with the (inverted) pole of positive activation of the affect/activation dimension in the model of Watson and Tellegen, and deem it equivalent to their scale of "Low positive emotions *RC2*" (see above, *Origins of* RC *scales*). It would be part of the authors' "growth" concerns to finally have a measure of anhedonia (*RC2*) to keep MMPI-2 ahead of contemporary developments in personality and psychopathology. They seem unaware that, as early as 1970, C. G. Watson, Klett, and Lorei (1970) developed for the MMPI a measure of anhedonia (Anhed scale), which preceded the work of Chapman, Chapman, and Raulin (1976) on the measure of physical and social anhedonia, and Kwapil, Chapman, and Chapman (1999), Kwapil, Barrantes-Vidal, and Silvia (2008), on the Wisconsin Schizotypy Scales measuring instrument. Then, still for the MMPI, Dworkin and Saczynski (1984) developed a measure of hedonic capacity (HedCap scale). Currently, at MMPI-2, the **INTR** scale (Introversion, the fifth of the **PSY-5** scales) is itself a measure of anhedonia (in particular the **INTR1** subscales, or "disengagement-anhedonia", and **INTR3** or "low diligence-hypomania"). Additionally, the **0(Si)** scale measures something similar.[10] In Ranson et al. (2009), Table 7.4 reports the results of two studies on the correlations between the Chapman physical and social

[10]The **0** or **Si** (Social Introversion) scale is a non-psychopathological clinical scale that is part of the basic clinical profile of MMPI/MMPI-2.

anhedonia scales and measures of MMPI/MMPI-2 anhedonia (*RC2*, **INTR** and **Si**). These results indicate that *RC2* does not predict better, and in most cases predicts worse than the **0(Si)** and **INTR** scales. It is therefore untrue that MMPI/MMPI-2 lagged behind contemporary developments in personality and psychopathology, at least as regards anhedonia.

Recapitulation on RC *scales*

Summing up on the *RC* scales, making them conceptually more distinct from each other and individually more statistically consistent has not enhanced their external validity or produced useful measures for many psychopathologies encountered in clinical practice (see Gordon, 2006). This could have been the case for simple clusters of symptoms such as anxiety or anger, but not for complex clinical conditions such as those that the eight psychopathological clinical scales of the MMPI-2 strive to identify.

The authors of the *RC* scales (Tellegen et al., 2003), as we wrote above, announced: "The *RC* scales were designed to preserve the important descriptive properties of the existing MMPI-2 clinical scales while enhancing their distinctiveness." This statement captures the two main objectives of the *RC* project, namely to respond to a need for change due to an alleged "deficiency" of MMPI-2, and to respond to a need for "development". The first point concerns the reduction of the covariation compromising the discriminant validity of the clinical scales of the MMPI-2, which represented a drawback already recognized and which did not need justification. As for the second point, the authors sought to identify for each of the eight clinical scales of MMPI-2 its distinct definitional core in order to better represent the conceptually significant and clinically important construct of the scale. However, the overwhelming majority of U.S. MMPI/MMPI-2 experts believe that the *RC* project clearly missed both its goals. One of the reasons mentioned is the adoption by the authors of an affect model (the Watson-Tellegen model) developed by the lead author of the *RC* scales, an adoption that likely compromised the success of the project.

Alternatives to the MMPI-2 Clinical Scales Covariation Problem

The problems represented by the large covariation between the clinical scales of MMPI/MMPI-2 as well as the simple approaches offered to address it have been recognized for at least 50 years. The simplest and most expeditious method would be to discard items that overlap two or more of these clinical scales. Such a strategy responds directly to the objectives announced by the authors of the *RC* scales, who however did not mention any previous attempts in this direction (see Welsh, 1952; Adams & Horn, 1965).

While acknowledging the problem of item overlap, Tellegen et al. (2003) seem to ultimately downplay it, turning instead to other causes, such as variance in response style (e.g., social desirability), unforeseen comorbidity (e.g., certain strong correlations between neuroticism and psychotism), or the (surmised) invalidity of "subtle items" (although these items, unlike "obvious items", have a much lower rate of overlap).[11] However, nothing was done to explore the relative strength of the other possible causes, nor to assess the extent of the role played by the overlap of items itself.

The obvious strategy for overcoming the extensive covariation of these clinical scales by eliminating or reducing item overlap was therefore ultimately ignored by the authors of the *RC* scales, despite being simple way for them to achieve their goals.

In this regard, Nichols (2006b) explored three different solutions to the problem, using a clinical sample of 26,118 men and 26,425 women (Caldwell, 1997) and their results at MMPI-2.

1. As a first step, Nichols simply eliminated from each of the eight clinical scales of the MMPI-2 the 35 items that overlap at least three of these basic scales. As a consequence, the average cross-correlation between these scales fell from 0.59 to 0.39 (20% decrease in shared variance). Yet the average correlation between the modified scale and the intact mother scale remained high (at 0.94), a loss of only 13% of the shared variance.
2. Secondly, Nichols identified 37 items from the eight clinical scales whose contribution appeared to be significant in relation to factor 1 in two independent analyzes (Johnson et al., 1984; Waller, 1999). He then removed the variance contributed by this set of 37 items from each of the eight clinical scales. Using this strategy, Nichols obtained an increase in scale independence of 12% (decrease in mean intercorrelations from 0.59 to 0.47), while maintaining an average correlation of 0.97 of the modified scales with their parent scale, and a loss of only 6% of the shared variance.
3. Thirdly, Nichols combined the first two strategies by removing from the MMPI-2 clinical scales the items that appeared on the two "marker" options. He obtained a 25% increase in scale independence (decrease in mean intercorrelation from 0.59 to 0.32), while maintaining an average correlation of 0.88, i.e., a 23% loss of the

[11] The alleged invalidity of the "subtle" items constitutes a completely gratuitous assertion, because they are items which were retained at the MMPI, having successfully crossed the "contrasted groups" strategy, first for the first time, then by a cross-validation (see at the beginning of this text, section *Historical review: empirical psychometric strategy*). The authors of the *RC* scales obviously cannot accept this fact, which is incompatible with their theoretical-factorial strategy.

shared variance.

These simple tests all show how uncomplicated adjustments to the MMPI-2 clinical scales can increase their relative independence without a significant loss of concordance of the modified scales with their parent scales. They demonstrate how easily the objectives advocated by the authors of the *RC* scales may have been achieved, this without resorting to radical procedures which end in a set of *RC* scales endowed with concordances with their parent scales too weak to justify a meaningful interpretation of the new scales (see Rogers, Sewell, Harrison, & Jordan, 2006; Butcher et al., 2006).

New analysis of the covariation of MMPI-2 clinical scales

The authors of the *RC* scales rejected Nichols' analyzes for two reasons (see Tellegen et al., 2006). They estimated that internal analyzes of MMPI/MMPI-2 only were insufficient without analyzes involving external criteria, and they also considered that the conclusions of Nichols (2006b) and Rogers et al. (2006) were based on an inadequate set of data.

To these criticisms, Ranson et al. (2009) first retorted that the admitted value of external analyzes in no way diminishes the importance of the conclusions resulting from the internal analyzes[12] and that, in fact, the method and the procedures followed in the construction of the *RC* scales themselves largely had rested on such internal analyzes.

Critics then focused on the inadequacy of Caldwell's sample (1997), a sample supposedly «not representative of any specific clinical or other meaningful defined population and (is) more appropriately described as a composite sample, an amalgam, than as a well-defined clinical sample» (Tellegen et al., 2006).

To this, Ranson et al. (2009) responded that, despite the material made available to them, the authors of the *RC* scales, including Tellegen and Ben-Porath, opted not to redo and validate any of Nichols' analyzes or even use their own samples to which only they had access. Such replicated assays, if presented, could have provided direct evidence of the alleged deficiencies of the Caldwell sample. Based on Caldwell's clinical data set (N > 52,000), however, it is unlikely that the values reported from Nichols's analyzes are devoid of value.

To respond to the concerns, however easy to counter, of the authors of the *RC* scales, Ranson et al. (2009) decided to provide new analyzes based on 24 of their 25 diversified samples, excluding Caldwell's data. These were samples obtained (Rouse et al., 2008) in clinical, forensic, academic, medical, employment, military and community settings ($N = 29,983$). The authors (ibid., Table 7.2) report that the results of this new analysis largely reproduce the earlier findings of Nichols (2006b).

The small gain in independence (i.e., decrease in covariation) obtained by Tellegen et al. (2003) for the *RC* scales is wiped out by a loss of variance shared with the clinical scales of the MMPI-2.[13] Indeed, the correlations between the *RC* scales in the samples used by their authors show only minimal reductions in covariation (5%), but at the cost of a loss of conformity of about 48% compared to their mother scales. Therefore, the primary objective of the authors of the *RC* scales, i.e. to considerably reduce the covariation that compromises the discriminant validity of the clinical MMPI-2 scales, seems to have been achieved only marginally, and by both more debatable and complicated methods when simpler means would have been sufficient.

Of all the authors who have experimented with new ways of decreasing the covariation of these clinical scales, none have been permitted to intervene constructively on the MMPI-2 test, except Tellegen, Ben-Porath et al., who are in fact the implicit "associates" of The University of Minnesota Press, which controls this test.

Conclusion: failed transition from *RC* scales to MMPI-2-RF

In 2003, with the approval of The University of Minnesota Press, the *RC* scales were introduced in the MMPI-2 Extended Score Report by the computerized correction service NCS-Pearson Assessments. It is conceivable that this insertion was like a dog in a bowling game, considering the problematic psychometric kinship these scales have with the MMPI and MMPI-2 instruments. Many authors of MMPI-2 (Tellegen, Ben-Porath, Graham: see Butcher et al., 1989; Butcher et al., 2001) were at the origin of this insertion (Tellegen et al., 2003). Butcher, on the contrary, has never let go of his criticisms of the *RC* scales, either as editor (Oxford Handbook of Personality Assessment: see ROUSE et al., 2008) or as author (see for example Butcher et al., 2006, and Butcher et al., 2015).

Then, in 2008 (see Ben-Porath & Tellegen, 2008, 2011; Ben-Porath, 2013), the MMPI-2-RF (RF for Restructured Form) was published, which is built on a hierarchical factor structure (top-down approach), including at the intermediate level the *RC* scales, a self-reported inventory of 338 items grouped into 51 new or revised scales. This test is not a revision of MMPI-2 (see Butcher et al., 2015; Friedman

[12] The argument is inescapable since, in this case, the object of the internal analyses is precisely the internal overlap of items.

[13] A loss that is likely the combined result of two procedural decisions: reduction of number of items per scale (impoverished reliability) and imposing high inter-item correlations (toning down of the psychometric construct richness).

et al., 2015; Graham, 2012; Greene, 2011; Nichols, 2011; Ruchenne, 2019); rather, it is an avatar of it and it differs essentially from the MMPI-2. This RF form should therefore be considered as a new instrument and not as an update of the MMPI-2 as was the case when the MMPI was changed to MMPI-2. In short, the MMPI-2-RF is a new psychometric instrument and was not validated on several aspects. It lacks the empirical support (with attendant credibility) and the interpretive data of the MMPI-2 (Friedman et al., 2015). The designation MMPI-2 (*RF*) is even considered to be undue, even illegitimate.

To add insult to injury, the University of Minnesota Press publishers and their distributors Pearson Assessments recently released an "MMPI-3" (emerged from MMPI-2-RF), which basically has nothing to do with MMPI/MMPI-2.

For the moment, the *RC* scales, resulting from a theoretical and factorial strategy, are no match for the empirical psychometric strategy that made and still makes the MMPI/MMPI-2 instruments the nec plus ultra of personality inventories used in clinical and psycho-legal contexts. While, in principle, it is interesting for a personality inventory to shed light on the factorial constructs that constitute it for the user, it aims first and foremost to produce convincing data and reliable indications for practice, either clinical or psycho-legal, as the empirical approach of the classic MMPI/MMPI-2 allows. The identification of a syndrome or a clinical disorder from an objective external criterion is here the essential element of the empirical psychometric strategy. Nowadays, it typically proceeds by discriminant function analysis, giving rise to a form of validity which is also called "discriminant" or “criterion” validity (McLachlan, 2004). Discriminant function analysis makes it possible, by association of items on identified, ‘typed’ groups, to capture the configuration of “facets” (Guttman, 1954; Guttman & Greenbaum, 1998) which constitutes each type and is likely to trigger or reveal psychopathology. It is the correlations of the items with an external criterion that matter most, not the correlations between items.

If one undertook a re-validation of the clinical scales of MMPI/MMPI-2 by forming new clinical groups for comparison with a normal sample, which has not been undertaken since the 1940s, perhaps it would represent the solution for the future. In the meantime, a possible demise of MMPI-2 would be the result of poorly thought-out psychometrics and questionable editorial maneuvers, with disastrous clinical repercussions.

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