

# Chapter 12

## The Dynamic Definition of Creativity: Implications for Creativity Assessment



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**Abstract** Within this chapter, we consider the dynamic definition of creativity within a practical context, with roots in psychological measurement. A discussion of some of the existing measures of creativity is provided, with an attempt to assimilate them to the dynamic definition of creativity, as proposed by Corazza (Creat Res J 28:258–267, 2016). In most cases, some adaptations to the measures are required in order to acknowledge new criteria, such as creative inconclusiveness, and some ideas are presented here for future researchers to consider. Ultimately, it is argued that the dynamic definition of creativity is timely, necessary, and an important step in developing the field of creativity research.

### 12.1 Introduction

Everyone has an idea of what creativity is, yet when attempting to define it, it is one of those notoriously difficult psychological concepts that words can never seem to accurately represent. If defining creativity is difficult, reaching a consensus of its definition is near impossible. However, a consensus amongst creativity researchers (at least) is required now more than ever if we hope to credit the field with consistent and reliable empirical investigations that build on the findings of those before us. Creativity has been measured in many different ways: through convergent thinking tasks (e.g., Mednick 1962), the creation of a product (e.g., collages; Amabile 1982; Baer 1996; poems: Kasof 1997; and stories; Wolfradt and Pretz 2001), and also with larger batteries that include divergent thinking tests (e.g., Guilford 1967; Torrance from 1966). These measures were all designed with various versions of a definition of creativity in mind. This chapter will consider these existing creativity tests, and will discuss their compatibility with the new dynamic definition of creativity, with adaptations suggested where possible. We take our definitions from Corazza (2016),

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as there he details the intricacies of both the previous standard definition of creativity, and the newly proposed dynamic definition of creativity. The standard definition used is: “creativity requires originality and effectiveness” (Corazza 2016, p. 259). The dynamic definition of creativity is: “creativity requires potential originality and effectiveness” (Corazza 2016, p. 262).

Specifically, the measures we consider here are divergent thinking, the Consensual Assessment Technique, self-report, historiometry, and the Remote Associates Test. We provide a brief explanation of each measure, before analysing its compatibility with the dynamic definition of creativity, and include possibilities for altering the method to investigate various aspects within the dynamic definition, such as creative inconclusiveness, or the creative process.

It is near impossible to determine how creativity is currently measured in education establishments, if it is at all. The dynamic definition of creativity looks to the future, and it is hoped that some of the measures described here could be utilised in schools, colleges, and universities to develop powerful, maybe even longitudinal data, that will aid our understanding of the creative process.

## 12.2 Divergent Thinking

The invention of tasks measuring divergent thinking (a creative act in itself) aided a rise in creativity research as requested by Guilford in his Presidential speech at the American Psychological Association in 1950, and most of the subsequent research publications measuring creativity empirically have used a form of a divergent thinking task. As tests of divergent thinking are so commonly used, and are quick and convenient to administer, this seems an appropriate starting point for discussing creativity in relation to the new dynamic definition.

Divergent thinking involves the production of numerous answers for one given question or problem, an example being ‘list unusual uses for a tin can’ (Torrance et al. 1992). Divergent thinking tests are thought to facilitate the measurement of creativity, as the participant has an opportunity to provide multiple original and effective ideas or answers, thus conforming to the definition of creativity itself. Specifically, fluency, flexibility, and originality scores are the most commonly recorded scores from a divergent thinking task. Fluency is the number of ideas the participant produced, flexibility is the number of different types of response, and originality is a measure of how unique or novel the idea is. (Occasionally elaboration, the amount of detail included, is also measured in tasks requiring drawn responses.)

Divergent thinking seems to have become synonymous with creativity, which does not reflect the complex nature of creativity, but does give merit to the importance of divergent thinking tasks in the measurement of creativity. Specifically, tasks of this type are considered to be predictors of creative potential (Kuhn and Holling 2009; Runco 2004; Torrance et al. 1992), in line with the standard definition

of creativity. These types of tests would therefore be ideal for use by educators, to begin the tracking of the creative potential of new generations.

It is important that explicit instructions emphasising the importance of originality in the production of the ideas are given to the participant before they begin any divergent thinking tasks. For example, an instruction such as ‘think of ideas that other people might not think of’ (Torrance et al. 1992) helps to raise creativity scores as it encourages participants to avoid listing menial, ‘normal’ ideas that would not contribute to their flexibility or originality scores. It is therefore assumed that with that instruction, participants who complete a divergent thinking task are actively trying to think creatively, thus are in pursuit of a creative goal (as defined by Corazza (2016, p. 262): “A creativity goal is the intention to generate items, pertaining to a focus area, showing originality and effectiveness”).

A key element of the dynamic definition of creativity is that outcomes should have the potential to be original and effective, but responses that are not deemed to be adequately original or effective at that point should still be considered as important aspects of the creative process. Corazza (2016) refers to this as creative inconclusiveness, and provided a full definition: “Creative inconclusiveness corresponds to insufficient attribution of originality and/or effectiveness to the represented outcomes of a creative process by any estimator at a specific time” (p. 263).

The most common way of assessing divergent thinking test performance – fluency – does not involve making any judgements about the originality or effectiveness of the responses; all that is measured is the number of responses. As the participants are instructed to think creatively, in this way, fluency could be seen as assessing creative inconclusiveness. Responses may be unoriginal or ineffective, but would still count towards the fluency score and represent attempts to be creative and the pursuit of a creative goal.

Although not as commonly reported, the assessment of flexibility in divergent thinking task performance is valuable and could contribute to an understanding of the creative process, defined by Corazza (2016, p. 263) as “a process enacted by an agent in the pursuit of its creativity goals”. For example, if the responses are considered in the order they are presented by the participant, it may be possible to identify the development of ideas across the course of the task. With the addition of a participant dialogue, where they verbally describe their ideas as they come to them, the creative process experienced in that task could be qualitatively analysed for the strategies used and associations made. This could be a valuable method of studying the thought process in pursuit of a creativity goal.

Arguably, originality should be the most valued measurement taken from a divergent thinking task. Traditionally, originality is determined by the statistical (in)frequency of responses, and in large batteries, this can be based on the previous performance of large normative samples (e.g., Torrance Tests of Creative Thinking, from 1966), or frequency may be relative to others within the current sample. This way of assessing originality is convenient and objective, but could allow for original but not particularly effective responses to be counted. It could be said that statistical infrequency does not fully address the construct of originality, which presumably also incorporates elements of subjective judgement, such as surprise (as perhaps

experienced by the scorer). An alternative approach to assessing the originality of divergent thinking tests therefore would be to have the responses rated for originality (by an estimator or the creative agent themselves). Given that the dynamic definition places emphasis on the subjective judgement of estimators, this method of scoring would appear to fit the dynamic definition well.

### 12.3 Consensual Assessment Technique

Recognition of the potential for originality and effectiveness can come from two sources. The first from the individual themselves (self-report as later discussed). The second, is from the perspective of others. The Consensual Assessment Technique recruits judges (usually experts in the relevant field, although not exclusively) to use their own subjective definitions and opinions of what is creative, to assign a mark out of five or ten to each product/solution generated by the participants (Amabile 1982). This can be used for almost any type of product made, such as divergent thinking solutions, collages and artwork, poetry, and written/verbalized ideas. Reliability ratings between judges and across tests using Cronbach's alpha coefficient have been found to be high, with scores typically ranging from .7 to .9 (Kaufman et al. 2008a). This scoring method is thought to be ecologically valid as it is similar to the method by which creative products are judged in real life, by critics.

The Consensual Assessment Technique is considered by some to be the gold standard of creativity assessment (e.g., Kaufman et al. 2008b), and we suggest here that with some minor adaptations, it could still be a powerful assessment tool alongside the new dynamic definition of creativity. In fact, through the Consensual Assessment Technique, it may be possible to study multiple aspects of dynamic creativity, including the creative potential of an agent, the product of a creative process, the representation of a creative product, and the estimator.

Firstly, we briefly consider the assessment of the creative potential of an agent or participant, for which Corazza (2016) gave the following definition: "The quality and quantity of resources invested by an agent in the pursuit of creativity goals" (p. 263). One very simple way of measuring the creative potential of an agent within laboratory studies, would be to provide participants with a variety of materials and the instruction to create a collage, or an item of art of some kind. This could be assessed using the Consensual Assessment Technique by showing estimators the resources (time, environment) and materials that were available to the agents, alongside the final products of the creative process. The estimators could then use this information to provide their score on how creatively the items have (or have not) been used.

The key characteristic of the Consensual Assessment Technique is the judges, or estimators. Corazza (2016) provided the following definition of an estimator: "An agent observing the representations of the outcomes of a creative process and conceiving the ensuing potential effects in terms of originality and effectiveness"

(p. 263). In this context, we consider the assessment tool in relation to the judgement of the represented product of the creative process (as opposed to the agent or process itself). The “definition of product of a creative process [is]: “An outcome of the process with a potential for originality and effectiveness”” (Corazza 2016, p. 263). These definitions could be incorporated into the Consensual Assessment Technique, with an adaptation to the instructions to the estimators. In evaluating products such as artwork or inventions, estimators could firstly provide their subjective creativity rating as usual. Then, the estimators could be asked to score the products again, this time with their own views on the potential originality and effectiveness, meaning the estimators could be asked to provide three scores rather than just one. The creativity score should be rated first and separately to the secondary scores, so that it is not affected by them. This could be a valuable first step in aligning the Consensual Assessment Technique to the dynamic definition of creativity, as analysis comparing the three scores could be conducted, revealing any differences between scores according to the instruction type (i.e., subjectively rate for creativity, vs. rate potential originality/effectiveness). If there were no differences, then the adaptation suggested would not be necessary, and the assessment method would be suitable for the dynamic definition without change.

Following the provision of ratings, the expert estimators could contribute a qualitative statement on why, or why not, a product has been scored as potentially original and effective. Although these suggestions convolute the Consensual Assessment Technique, which until now is more streamlined, it would add a level of richness to the data that can be used in numerous ways.

Firstly, the mean creativity scores from the estimators could be used to represent the perceived creativity of the product. Secondly, the two additional scores proposed here could represent the perceived creative potential of the product. Thirdly, the qualitative data could be highly valuable, as it could highlight potential uses, or applications of the product beyond what was originally conceived. Experts within a field could view the products differently, and this could result in a wide scope for creative potential. This could be expanded even further by using experts from across different fields. For example, engineers, artists, and designers would all consider an item differently, and where a product may be ineffective and unoriginal in one field, it could be exemplary in another. Indeed, if there was disagreement amongst the estimators with a consensus not being possible, this would be interesting from a dynamic creativity perspective.

The Rite of Spring, a ballet by Stravinsky, for example, is particularly well known for dividing opinion. At the first public performance in 1913, some audience members disliked it so much that there was nearly a riot and critics were split in their reviews. Yet, it is now regarded as one of the most influential orchestral works of the last century. Famous painting *Le Déjeuner sur l’Herbe* (1863) by Édouard Manet was scandalous and notorious in its day, with the Salon in Paris refusing to exhibit the piece. Now, Manet’s style is considered ground-breaking, and made way for the impressionist movement in the following years.

Perhaps strong disagreement by estimators could be a sign of creative potential, or disruptive innovation, especially in public works, as controversy leads to attention,

which could lead to the work having a real impact. Some of the most groundbreaking, paradigm-shifting creative products are those most likely to divide opinion. Thus, research in to consensus of creativity can teach us a lot, but perhaps research in to non-consensus would yield more dynamic and realistic findings.

Another important aspect to consider here is that the Consensual Assessment Technique could aid in the study of originality and effectiveness over time, which could lead to a more 'literal' measurement of creative potential. It is well known that the works of many famous creators were valued years later, as was the case for Stravinsky and Manet, or even posthumously, meaning their work was potentially effective, and it reached that potential, but at a later time.

This proposed adapted method would result in thorough, rich data that go beyond the standard way of assessing creativity, to consider a product dynamically. The short, medium, and long term effectiveness of the products could also be measured if the procedure was repeated over time. Whereas the earlier version of the Consensual Assessment Technique (Amabile 1982) provides a 'snapshot' measurement of creativity, the adaptations here provide a dynamic, rounded assessment of the creative product. However, it is not deniable that this whole assessment would be time and resource expensive. It is certainly the case that further research would be required to support the statistical validity and reliability of this assessment method, and researchers may wish to adapt these ideas on a small scale initially. Importantly, the qualitative aspect here should prevent the creative agent, process, and product from being replaced by numbers and statistics, thus protecting the essence of creativity, which arguably cannot be calculated numerically.

Having discussed the judgement of others on a creative piece, it is appropriate to examine self-judgement, in the form of self-report measures of creativity.

## 12.4 Self-Report

A crucial element of the dynamic definition of creativity is that the creative process and its outcomes are subjectively assessed for creative potential, and the first person to estimate such potential is always the creative agent themselves. It would therefore make sense to consider self-report measures of creativity as possible methods of assessing the dynamic definition. Such measures have been suggested as having a higher degree of face validity than other methods of assessing creativity (Hocevar and Bachelor 1989), and the best predictor of future creative behavior is previous creative behavior (Colangelo et al. 1992). Self-report measures are usually quick and inexpensive to administer, and can ask individuals to report on creative activities, achievements, behaviors, and thoughts, and so may well represent a convenient, flexible, and comprehensive approach to assessing creativity.

This section will consider some of the most popular and useful self-report methods currently in use, and how well they encompass the dynamic definition of creativity. (Please see Silvia et al. 2012; and Kaufman et al. 2008a, b for helpful reviews).

The Creative Achievement Questionnaire (Carson et al. 2005), is a popular measure, used in a number of studies (e.g., Agnoli et al. 2016; Mar et al. 2006; White and Shah 2011). Unsurprisingly given its name, the Creative Achievement Questionnaire focuses on creative achievements, and considers significant creative accomplishments in 10 different domains: visual arts, music, dance, architectural design, creative writing, humor, inventions, scientific discovery, theatre and film, and culinary arts. Participants indicate achievements in each creative domain (e.g., for music, options include “I play one or more musical instruments proficiently”, “I have composed an original piece of music”, and “My compositions have been critiqued in a national publication”), and can receive a score for each domain as well as a total score combining the domains. This scale therefore only focuses on observable achievements and does not take into account inconclusive outcomes or the creative behaviors behind such achievements – the final creative achievement is all. As such, the Creative Achievement Questionnaire is undoubtedly useful for investigating creative success, but perhaps does not encompass the full range of creative activity under the dynamic definition.

Some other similar measures focus on creative activities and accomplishments, but also allow for the more everyday creative behaviors. The Creative Behavior Inventory was developed by Hocevar (1979, 1980), and later adapted by Dollinger (2003), Dollinger et al. (2007). In both versions, participants are presented with a list of activities and accomplishments considered to be creative and are asked to indicate the frequency of those behaviors in adolescence and adult life. In the dynamic definition, creative achievement requires both originality and effectiveness, and although some items in the Creative Behavior Inventory refer to creative outcomes judged to be effective (e.g., “Had artwork or craft work publicly exhibited”), originality rarely features explicitly (e.g., “Prepared an original floral arrangement”). However, rather than this being a shortcoming, it may offer an opportunity to adopt a broader understanding of creativity. The Creative Behavior Inventory merely asks participants to report the frequency of creative behaviors – whether these lead to particularly effective or original outcomes is not the main issue. It could consequently be argued that this focus on engagement in creative behaviors allows for a broader and more dynamic understanding of creativity to be assessed. Several items make no reference to originality or effectiveness; for example, the item “Made your own holiday decorations” does not state that these decorations should be original and effective, nor does it ask participants to make judgements about the creativity of these decorations. In responding to this item, participants could include decorations that are unoriginal (same as previous years, copied from the internet) and/or ineffective (poorly made, unattractive, do not resemble what they were meant to), as well as highly original and effective decorations, and so items such as this can encompass both creative inconclusiveness and creative achievement – key elements of the dynamic definition of creativity.

Batey’s (2007) Biographical Inventory of Creative Behaviors (BICB) is an alternative measure of creative behavior, which, like the Creative Behavior Inventory, offers the opportunity to assess the dynamic definition of creativity to some extent. In the BICB participants are asked to indicate in which of 34 creative activities they



have been involved over the past 12 months. While most of the activities involve an identifiable creative achievement or outcome (e.g., “Written a novel”, “Formed a sculpture using any suitable materials”), in only a few items is the originality or effectiveness of the achievement actually specified (e.g., “Had an article published”, “Invented and made a product that can be used”); in other cases, the outcome has the potential to be original and effective, thus allowing for a more dynamic interpretation of creativity to be assessed.

More recently, Benedek, Jauk and colleagues (Diedrich et al. 2017; Jauk et al. 2013, 2014) developed the Inventory of Creative Activities and Achievements (ICAA), which combines elements of the CBI and CAQ in that both creative activities and creative achievements are assessed. Respondents are asked to indicate the frequency of creative activities and behaviours across a range of different domains, over a period of 10 years, as well as rate the level of achievement in the domains. The timescale covered in the ICAA is longer than that in the BICB, and shorter than in the CBI, and thus seems to be a happy compromise. The ICAA appears to provide a comprehensive and versatile assessment of real-life creativity across a range of different creative domains, and at different levels of creative achievement, and findings suggest that it will be a useful addition to the assessment of creative activities and achievements.

Some other self-report measures of creativity take a different approach, and, rather than focusing on frequency of observable behaviors or accomplishments, ask participants to self-rate their own creativity. For instance, Kaufman et al. (2009a) developed the Creativity Domain Questionnaire, in which participants rate their own creativity over 56 domains, covering seven different areas of creative behavior: artistic/visual, artistic/verbal, performance, math/science, problem solving, interpersonal, and entrepreneur; a shortened modified version – the Revised Creativity Domains Questionnaire – was developed (Kaufman et al. 2009b), with 21 domains over four areas: math/science, drama, interaction, and arts. What is crucial here is that in both measures participants use their own definition of creativity, thus allowing for subjectivity in assessment, and the possibility that some participants’ responses may reflect potential for originality and effectiveness, and creative inconclusiveness, and not just creative achievement. However, without having a clear understanding of which definition an individual is using, it is difficult to determine if the dynamic definition is being assessed. The Kaufman Domains of Creativity Scale (Kaufman 2012) also requires participants to self-rate creativity, but items make reference to specific examples of outcomes and accomplishments within domains, rather than focusing on the overall domains. In this way, some items directly refer to originality and/or effectiveness (e.g., “Composing an original song”, “Choosing the best solution to a problem”), whereas others offer a more dynamic interpretation (e.g., “Making up rhymes”, “Enjoying an art museum”). What is more, when participants have not actually done one of the listed acts, the Kaufman Domains of Creativity Scale instructs them to estimate their creative potential in these activities. Thus, a dynamic approach could apply here.

The final type of self-report measure considered here goes further, and focuses on the thought processes behind creative outcomes, and individuals’ creative



self-beliefs. Beghetto and Karwowski (2017) helpfully make a distinction between creative self-efficacy, which reflects perceived confidence in relation to an impending creative task; creative metacognition, which represents beliefs about knowledge about one's own creative strengths and weaknesses, as well as knowledge about the creative contexts; and creative self-concept, which refers to a more generalized judgment about one's own creative ability. Taken together, it is argued that these three concepts contribute to creative identity, and Beghetto and Karwowski (2017) urge creativity researchers to be clear and specific about which concepts and definitions they are using.

Previous measures of creative self-efficacy have included short, simple questionnaires, such as Beghetto's (2006) three items: "I am good at coming up with new ideas", "I have a lot of good ideas", and "I have a good imagination", and Jaussi et al. (2007) proposed an additional four-item self-efficacy questionnaire: "In general, creativity is an important part of my self image", "My creativity is an important part of who I am", "Overall, my creativity has little to do with who I am" (reversed scoring), and "My ability to be creative is an important reflection of who I am". However, Beghetto and Karwowski (2017) now recommend that measures of creative self-efficacy should be future-oriented, and should focus on confidence in performance, rather than competence, and so the previous questionnaires arguably do not fit this stricter definition.

The concept of creative self-efficacy is important as those with high self-efficacy are more likely to gear their behavior towards fulfilling a specific goal as they believe they can achieve this, whereas those with low self-efficacy are likely to envisage failing to achieve, and will therefore place obstacles in their way (Bandura 1993). It has been stipulated that strong self-efficacy in this context is essential for creative production, motivation, and the ability to behave creatively (Bandura 1997; Tierney and Farmer 2002).

When assessing creative metacognition, Beghetto and Karwowski (2017) recommend that researchers should take into account the accuracy of one's own confidence in performing a task and whether that matches with actual performance. In addition, a true measure of creative metacognition should also assess an individual's ability to regulate their creative behaviour and beliefs in relation to the context (e.g., try a new strategy, persist with current approach).

At a broader level, researchers can also assess creative self-concept, which reflects more stable general beliefs about creative abilities in different domains (Beghetto and Karwowski 2017). This can include assessments related to competence and/or enjoyment (e.g., "I am good at writing poetry" vs. "I enjoy writing poetry"), and should focus on more holistic assessment of past performance.

The Runco Ideational Behavior Scale (Runco et al. 2001) is a 23-item questionnaire which assesses the thought processes associated with creative behaviour, and consequently taps into creative self-efficacy, creative metacognition and creative self-concept. Items reflect an individual's thinking and ideas related to creativity (e.g., "I would rate myself highly in being able to come up with ideas"; "I am good at combining ideas in ways that others have not tried"; "I like to play around with ideas for the fun of it"). The focus here, and in other similar measures, is on

ideational behaviour and self-belief, and not necessarily on the creative outcome, and so could be seen as allowing for creative inconclusiveness as well as creative achievement, and is therefore a promising method of assessing the dynamic definition of creativity.

Taken together, self-rated measures of creativity offer researchers the opportunity to examine the creative agent's own perception of their creativity, and in some instances go beyond creative accomplishment, with items that allow the incorporation of creative inconclusiveness. It would appear then, that these measures can already assess numerous aspects of the dynamic definition of creativity.

## 12.5 Historiometry

The historiometric approach to assessing creativity focuses on eminent individuals who are universally recognized as being creative as subjects (Simonton 1997b), and involves quantitative analysis with large numbers of eminent creators, with the aim of identifying general rules or laws. On first inspection, with such an emphasis on creative success and quantifiable creative achievements, historiometry may not appear to fit well with the dynamic definition of creativity; however, some elements of this approach do in fact lend themselves to a more dynamic definition.

A key part of the dynamic definition is that outcomes may have the potential to be original and effective, but judgement of these outcomes is not static or absolute – it can vary over time. Simonton (1998a) adopted the historiometric approach to examine precisely this. Looking across 496 operas by 55 different composers spanning 332 years, he saw that the contemporary aesthetic judgement of an opera is related to how an opera was initially received, but this relationship changes over time in a cyclical fashion. A similar cyclical pattern was found in relation to the melodic originality of classical music themes (Simonton 1984, 1998b). Thus, this research would appear to support the dynamic definition, and suggests that estimating creativity at one point in time may provide a limited view of the phenomenon.

Other historiometric studies look at creative productivity over time, and examine the number of creative products generated within a specific time period (e.g., Simonton 1997a). The historical data sources for this type of investigation, such as encyclopedias, will only include outcomes which, over the passage of time, have been judged to be of importance by critics within the field of interest and are thought to be worthy of inclusion. This recognizes the subjective, context-dependent and time-related element to the judgement of creativity; indeed, there are numerous examples of individuals whose creative work was not fully appreciated by contemporary audiences, but who were later recognized for their eminent creativity (e.g., Vincent van Gogh, Paul Gauguin, Franz Kafka). By adopting a historical approach, historiometry allows the investigation of creators and creative products whose creative potential was only later realized.

However, the historiometric approach still focuses predominantly on creative achievements. Creative inconclusiveness could perhaps be investigated (e.g., by

looking over drafts of novels, or sketches), but this would rely on historical records being complete, reliable, and accurate, which may be difficult to achieve. Nonetheless, this approach to creativity assessment offers a historical and dynamic perspective, which would appear to be unique. This approach may be a good starting place for students of creativity, to encourage consideration of the processes behind creative works, the idea that we rarely see evidence of inconclusiveness, yet it absolutely must exist.

### ***12.5.1 Remote Associates Test***

The last measure to be considered here is the Remote Associates Test, which warrants discussion as it is a popular measure, likely due to its neat design and convenient nature. The associative theory of creativity posits that successful creative thinking may be the result of forming new and useful associations between disparate concepts (e.g., Mednick 1962; Schmajuk et al. 2009). The thought that creativity consists of an associative process is an “old and sturdy” (Barron and Harrington 1981, p.12) theory in psychology, with the most well-known contribution being from Mednick (1962). An association is a link between two ideas, elements, or stimuli, which can be strong or weak, although Mednick (1962) argued that the weaker or more remote the association is, the more creative it is. Within the associative theory, word association tasks are frequently used. The original Remote Associates Test was produced by Mednick (1962; more recently updated and made readily available by Bowden and Jung-Beeman 2003) for the purpose of measuring creative thought through association. Each trial comprises three words, and the participant is required to produce a fourth word that relates to each word separately. An example trial is: cottage, Swiss, cake; the solution being cheese (cottage cheese, Swiss cheese, and cheese cake).

It could be argued that the Remote Associates Test is useful for assessing how individuals think about words, and how they can be flexible in thinking beyond the immediate meaning of words. This relates to the old concepts of fixation breaking, and venturing outside perceived limitations (in this case, of language) detailed in problem solving theories (e.g., Luchins 1942; Ohlsson 1992). By some, this is thought to be key to the production of creative ideas, as breaking perceived barriers can lead to novel associations being made (Ansburg and Hill 2003; Mednick 1962). One’s ability to commonly break fixations and mind-sets, as measured by the Remote Associates Test may therefore be indicative of their potential to be original, in line with the dynamic definition of creativity. However, getting from a word association task to determining creative potential does not appear to be straight forward.

It is the contention of the authors that the Remote Associates Test is an inappropriate measure of creativity, as it does not allow participants to be original, a requirement of the standard definition of creativity, and that it in fact measures other facets of cognition instead, such as vocabulary and verbal intelligence. The studies run by

Mednick and colleagues claiming to have found constructive and predictive validity for the Remote Associates Test did not control for participant intelligence, and featured participants who were arguably both highly intelligent and creative; architects, scientists, and engineers (see Mendelsohn 1976 for a review). The Remote Associates Test is still frequently used in creativity research today, however it may not be manageable for participants with limited vocabulary or knowledge of the verbal cues used. The reliance on convergent thinking and intelligence, rather than creative thinking, may be too high within the Remote Associates Test, making it unsuitable for purpose. In support of this, it was found that the Remote Associates Test has higher correlation values with IQ, specifically aspects of verbal IQ, working memory, cognitive speed and accuracy, and school achievement, than it does with any creativity scores (as measured by tests of divergent thinking, Lee et al. 2014; Taft and Rossiter 1966). Whereas it has been demonstrated that tests of divergent thinking, for example, have predictive validity with other measures of creativity (e.g. Runco 2004), the Remote Associates Test has rarely been even moderately related to divergent thinking (Lee et al. 2014). This implies that the Remote Associates Test may involve processes outwith those in creative thinking.

Furthermore, beyond the study of creativity, the Remote Associates Test has been used in studies investigating bipolar and manic-depressive disorders (Fodor 1999), the effect of feedback on performance (McFarlin and Blascovich 1984), search strategies (Smith et al. 2013), social intelligence (Keating 1978), and even erotomania in celebrity worship (McCutcheon et al. 2003). This highlights that the Remote Associates Test is a flexible measure, which thereby demonstrates its lack of construct validity.

In consideration of the dynamic definition of creativity described previously, it is posited here that the Remote Associates Test does not allow for potential originality, as there is only one correct answer that the participants are expected to produce. While the correct solution may be effective, if a participant came up with an original, novel solution that linked all three words in an abstract way, it would be scored as incorrect, thus the test may actually be anti-creativity. The existence of a pre-existing solution removes the possibility of demonstrating originality, novelty, and uniqueness, but also inherently eliminates the opportunity for establishing potential. As the test stands, the solution is the final step, and there is no opportunity for ideas to develop, or for creative elaboration in any way, like there is with divergent thinking tasks, or in the construction of creative products. It is also very difficult to comprehend what an adaptation of the Remote Associates Test would look like in order to sufficiently address both the standard and the dynamic definitions of creativity.

The associative theory however, could still be a useful model in investigation of the creative process, and there could be scope for utilising and testing this. For example, the process behind verbal creativity could be measured by asking participants to produce word association maps, perhaps in relation to an idea they have themselves, or cued in a laboratory setting. Participants could be presented with two random words, and using word association they could draw out links that might eventually connect the two words. Similarly, this method may be used effectively in the case of a divergent thinking task, such as the Unusual Uses Test. With the target

object at the top of the page, participants could be asked to list their ideas as normal, but could use arrows to indicate where one idea has been linked to, or has come from, another. This would illustrate the development of ideas (thus their potential, probably to a limited degree), and the associations that have been made along the process of being creative, if indeed this was the method used by the participant in being creative. If an individual did not use an associative process, fewer of their ideas would be linked, and this would be clearer. It could be hypothesized that the more connections made, the more remote the ideas become. Alternatively, if originality is poor, this could lead to the measurement of creative inconclusiveness in the creative process. A dynamic scoring system would need to be implemented, probably one that combined the methods of Torrance (1990), and the adapted Consensual Assessment Technique, as proposed above.

Where there is possibility for the associative theory of creativity to be useful in the measurement of dynamic creativity, it is concluded here that the Remote Associates Test is an unsuitable measure of creativity, be it standard or dynamic.

## 12.6 Implications and Conclusions

Having presented a discursive analysis of existing creativity measures and their compatibility (or not) with the dynamic definition of creativity, we will now briefly consider two important implications, ecological validity and considering creative products as ‘unfinished’.

Firstly, ecological validity is arguably a prominent problem in all studies that use laboratory based experiments to test human behavior and cognitive processes. Creativity within non-specialist samples may not naturally occur in a laboratory setting, and creativity tests may inadvertently inhibit creativity and creative potential, as opposed to facilitating it. For example, in consideration of a typical verbal divergent thinking task, a participant is limited to producing solutions that fit the requirements of the task (i.e., based on the target product in an unusual uses task) – and their output is taken as a measure of their creativity. But a musician, or a chef, or an artist, might not be creative in this verbal manner. The Consensual Assessment Technique looks to score creative products in an ecologically valid way, but the self-report measures discussed here, such as the Creative Behavior Inventory and Kaufman Domains of Creativity Scale, may be more suitable to combat this issue, and should perhaps be used in conjunction with other laboratory based measures.

For the dynamic definition of creativity to work in research, it may be that we need to consider all products made in testing sessions as ‘unfinished’. Thinking of an item as finished leaves no room for development, which may limit the item’s potential for originality and effectiveness. If the item is considered unfinished, this leaves options open for further developments and adaptations of item, which could form the basis of a highly original and effective solution. We may also need to consciously separate the creator’s intended purpose of the product, from the potential purpose of the product. This may be required in order to fully contemplate an item’s

potential for originality, but this could only really be carried out by outsiders, those independent from the project. Doing so would open possibilities for the utility of the solutions. However, it can be argued that in order for a product to be effective at all, it should fit the brief of the task set. Outwith research, in ‘real’ creative situations, this may lead to a disparity between the creator and the critic, but the creator in any case would likely have different ideas of the purpose and the potential of their work compared to an outsider. This may be more of a philosophical issue that researchers may want to consider in future work.

Although Corazza (2016) proposes the dynamic definition of creativity is backward compatible with existing measures of creativity, it is important to remember that previous measures were not designed with this definition in mind. Thus, past methods may not fully address aspects such as creative inconclusiveness, and may not be suitable for measuring future potential. Of the measures and adaptations considered here, there are a number of promising options, but in order to fully encompass the dynamic definition of creativity, new original and effective assessment methods are required.

These methods may be of particular interest to educators. We believe that of particular importance to education, is an emphasis on creative inconclusiveness. Students (of all ages) should be encouraged to engage in their creative process with an emphasis on the value of this experience, but without the pressure of perfecting their masterpiece. If educators are made aware of the dynamic definition of creativity, and inconclusiveness in particular, this could rejuvenate the assessment of creative products. Rather than basing grades on a ‘finished’ creative product, new assessment methods could be designed that incorporate documentation and reflection on the experience of being creative.

Fundamentally, if creativity researchers wish to fully understand creativity, we should all adopt a consistent definition of the complex construct. In 1950, Guilford inspired the advancement of creativity research that was noticeably missing within psychological literature. The dynamic definition of creativity as fully described by Corazza (2016) is an impressive, modern, and thorough re-evaluation of the field of creativity generally, and specifically introduces new and important concepts such as creative inconclusiveness, which have not been valued previously. The dynamic definition is flexible, comprehensive, and offers new directions for investigation that should provide the momentum required for the next era of creativity research.

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