

RUNNING HEAD: Web-Based Creativity Tasks

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The Creative Task Creator: A Tool for the Generation of Customized, Web-Based Creativity
Tasks

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Abstract

A web-based tool for the creation of divergent thinking and open-ended creativity tasks is presented. A Java program generates HTML forms with PHP scripting that run an Alternate Uses task and/or open-ended response items. Researchers may specify their own instructions, objects, and time limits, or use default settings. Participants can also be prompted to select their best responses to the Alternate Uses task (Silvia et al., 2008). Minimal programming knowledge is required. The program runs on any server, and responses are recorded in a standard MySQL database. Responses can be scored using the Consensual Assessment Technique (Amabile, 1996) or according to Torrance's (1974) traditional scoring method. Adoption of this web-based tool should facilitate creativity research across cultures and access to eminent creators.

The Creative Task Creator: A Tool for the Generation of Customized, Web-Based Creativity Tasks

In this paper, we describe the Creative Task Creator, a Java-based tool that generates software that can be used for web-based administration of creativity tasks, including the Alternate Uses Task (Guilford, 1950), Silvia's modification of this task (Silvia et al., 2008), and an open-ended free response task. The Creative Task Creator is creative in two senses: it not only generates tasks, but also allows for flexibility in the design of those tasks. Use of the Creative Task Creator will facilitate the collection of data from participants in various populations, including participants across cultures and expert creators. Use of the software also streamlines the scoring process, as all responses are collected in digital format in a common database.

Measuring Creativity

Researchers have been attempting to measure creativity and creative potential since the mid-20th century. Guilford (1950) admonished the APA to undertake the task of studying creativity seriously, which required the development of materials for measuring the construct. Based on his Structure of Intellect model of intelligence, Guilford (1967) advocated several measures of divergent thinking ability. Expanding on the work of Guilford, Torrance (1974) developed a battery of such tasks, the Torrance Tests of Creative Thinking, which are still widely used in the field. One of these tests, the Alternate Uses Task simply asks participants to list as many uses as possible for a common everyday object such as a brick. Torrance also included figural tasks such as the Circles task, in which participants make drawings out of circles printed on a page.

Divergent thinking tasks are noted for their ease of administration and objectivity in scoring. Such tasks require little background knowledge and can be administered to participants

of any age or background. They can also be administered in groups, which facilitates the data collection process. Responses can be scored according to objective criteria such as fluency (number of ideas generated), originality (uniqueness of ideas), and flexibility (variability in categories of ideas).

More recently, creativity researchers have turned to measuring creativity using open-ended tasks, which are rated for creativity by judges. Rather than using content-general divergent thinking tasks with questionable predictive validity for later creative achievement, researchers have begun using tasks that prompt participants to create complete works, which are then rated for creativity. Tasks have included collage-making, essay-writing, and even caption-writing for cartoons. These tasks are scored using Amabile's (1996) Consensual Assessment Technique (CAT). This scoring system asks independent raters to judge each work according to their own subjective definitions of creativity. Amabile has argued that high rates of inter-rater reliability indicate that judges have consensus with respect to their definitions of creativity. This process has become very popular among creativity researchers. When relying on the CAT method, participants can create actual artworks, researchers can measure creativity in a specific domain, and judges can evaluate creativity using a more ecologically valid process than the traditional objective scoring methods used by Torrance.

A new idea with regard to creativity measurement is a hybrid model proposed by Silvia and colleagues (2008). Silvia and his colleagues modified the Alternate Uses Task to take into account each participant's own definition of what is highly creative. In this method, participants complete a traditional Alternate Uses Task and then indicate the top two ideas from their own lists. These ideas are then rated for creativity using the CAT. Silvia has argued that this method identifies participants who can not only generate many novel ideas but can also identify which of

their ideas are truly most creative. Runco (1991) has also argued that the ability to evaluate ideas is critical for real-life creative pursuits.

No matter which method of creativity measurement is adopted, assessment of creativity is often onerous and cumbersome. Using traditional paper and pencil administration, responses to divergent thinking tasks must be processed prior to scoring. Given that participants can generate dozens of responses for each prompt, the process of data management can become extremely time-consuming. Typically, the responses must be transcribed into a digital format, requiring that researchers decipher handwriting and correct spelling of thousands of responses. By its very nature, these steps increase the possibility that data may be compromised when researchers are forced to make judgments about the intended responses of participants. Creativity measures using the CAT involve similar problems. Because researchers using the CAT typically desire a more ecologically-valid creative product, they must allow participants a fair amount of time to make each creative work. These works must then be processed in preparation for the rating process. This software will facilitate the processing of data in these creativity tasks. Responses to divergent thinking and CAT tasks are typed directly by participants and stored in a digital format that can be downloaded for scoring at the researcher's convenience.

Creativity Tasks on the Web

The Creative Task Creator allows researchers with minimal programming knowledge to generate their own customized software for web-based creativity tasks. As with any web-based research, researchers who use this software can collect data from anyone with access to the internet, enabling them to recruit participants who are otherwise difficult to bring into the lab. Using the Creative Task Creator, researchers can create multiple Alternate Uses items, tailor their own instructions, specify a time limit if desired, and request that participants select their

best responses from those generated. In addition, researchers can create their own open-ended, free-response items. Such items can prompt participants to create an essay based on a given title, image, or sound. Examples used previously in the literature include Sternberg and Lubart's (1995) instructions to create an essay with the title "2983" and Kaufman's (2002) use of photographs to inspire creative responses. The possibilities for using this free-response prompt is limited only by the creativity of the researcher.

A major benefit of this software is that the responses from all participants are stored in a single, consolidated, digital database. Web-based administration ensures that data collected at multiple sites are stored in the same database. As mentioned above, storing responses electronically facilitates the export of data to a spreadsheet format for scoring or rating rather than requiring a lengthy and error-prone transcription process.

The Creative Task Creator

The Creative Task Creator is an open source, Java-based program that runs on any platform supporting Java version 1.5 or later. Researchers must have a host server with server-side PHP and MySQL functionality. Server space may be available through universities or departments, or the researcher may choose to pay a minimal fee for a professional web-hosting service such as Netfirms.com. Basics on how to conduct web-based research, including details on how to set up a server through Netfirms are described by Fraley (2007). Information on best practices in conducting internet research can be found in a paper by Reips (2002).

To use the Creative Task Creator, researchers download the files from <http://www.iwu.edu/~jpretz/creativity.html> (or the Psychonomics archive) and specify their menu options using the CreativeTaskCreator.jar program. The program generates the tasks in the form of HTML files that implement PHP scripting. The Creative Task Creator provides point-

and-click programming ability to researchers with no programming background. Experienced programmers can insert HTML code into any of the application's text inputs or opt to edit the created files directly. (See Figure 1 for an image of the Java interface.)

The Creative Task Creator allows researchers to design an Alternate Uses task according to their own specifications. As a default, the program includes three alternate uses objects (brick, chair, and deck of cards). Researchers can use these default objects, specify up to nine of their own, or eliminate the alternate uses task altogether. The default settings allow room for participants to provide up to 50 alternate uses for each object, though this number can be edited by the researcher as well. Researchers can modify the default instructions to suit their own purposes, including instructional manipulations. The alternate uses task also allows researchers to set a time limit for participant responses. The default is set at three minutes, but researchers can specify limits of up to 100 minutes or instead have participants submit their responses when they choose to be done.

In addition, the researcher can ask participants to designate which of their responses to the alternate use task are their best responses. Silvia and colleagues (2008) asked participants to identify the top two, but the researcher can specify this number as well. To allow participants to designate their best responses, the program automatically reproduces the list of participant-generated alternate use responses with corresponding checkboxes next to each. Participants then mark the checkboxes corresponding to their selections. The specific instructions for "top two" responses can also be edited. An additional, customizing feature is that the program automatically adjusts the task instructions to reflect the researcher-specified number of objects, time limit, and number of top responses.

The Creative Task Creator also facilitates the design of an open-ended task with researcher-specified instructions. The default instructions for this task reflect a domain-specific creativity task called the Dream Project Task (Landers & Pretz, 2008). Participants are prompted to describe a dream project in their major field of study given unlimited time and resources. This task was created to complement the domain-general divergent thinking tasks by soliciting creativity in the domain of training. The default time limit for this free-response task is 10 minutes. Researchers can choose to include up to 11 free responses items with the possibility of different instructions for each. The time limit can also be eliminated, asking participants to submit their responses when done. This very versatile prompt can be used to initiate any creativity task with written responses or even simply to ask for comments on the Alternate Uses task.

After the researcher has designed the tasks, the Creative Task Creator generates the customized software files and stores them in a folder with a default name “creativitytask.” These files contain the task specifications and key information about the MySQL server settings (host, database, data table, user, and password). To initiate the creativity tasks, researchers must open the file called “taskstart.php.” The functionality of the tasks, including time limits, can be tested off-line; however, no data will be recorded until the files are linked to the MySQL database on the server. To implement the tasks on-line, researchers upload the entire task folder to their server and integrate the task with their introductory web page by creating a link to the taskstart.php file. This link initiates the customized creativity software, and the MySQL data table is automatically created when the first participant completes the tasks.

Results are stored in the MySQL database hosted on the researcher’s server in the automatically-generated table specific to the tasks. Researchers then output the data as they wish

for scoring and/or rating. The MySQL code is easily identified within each PHP script, such that a skilled programmer may make minor modifications to record data in a Microsoft SQL or PostgreSQL database, or in another data format.

Data for each participant can be identified using a unique Participant ID number if desired. As a default, the MySQL database automatically records a unique “counter” variable for each participant in the table. Researchers preferring to specify an ID number for their data collection can enter this at the beginning of the testing session (if testing in a laboratory in person) or have participants generate a unique identifier on the spot. If participants are off-site, and a specific ID number is to be entered, researchers can instruct participants how to create a unique Participant ID on the introductory page. The ID field can also be left blank, but, as a caveat to researchers, repeat ID numbers are not detected by the program.

The Creative Task Creator is designed for creating tasks and recording data, not scoring responses. Researchers who are interested in scoring the responses on-line should consult a paper by Ames and colleagues (2005) for a suitable and flexible web-based program. Use of web-based ratings enables the entire process from data collection through scoring to be conducted off-site, if desired. Participants and raters can be recruited to contribute from anywhere in the world.

Discussion

This paper presents open-access software for web-based implementation of widely-used creativity tasks, including divergent thinking tasks and open-ended free-response tasks. To our knowledge, a web-based tool for creativity research has not yet been made available.

Furthermore, the Creative Task Creator affords researchers a great deal of flexibility in tailoring the tasks to their own research needs without requiring expertise in programming.

Use of this software eases the process of lab-based data collection. Participants can be brought into the lab and asked to complete the materials online. The resultant data are stored in a digital format, in a single database, ready for download. When researchers bring participants into the lab, they can provide prompts that are not easily presented on the computer screen (e.g., a physical prop as the subject of brainstorming alternate uses). Researchers can also include additional creativity tasks in the protocol (e.g., collage-making).

We hope that the Creative Task Creator can provide a starting point for researchers who desire to go beyond the basic administration of these creativity tasks. One limitation of the software is that it is currently designed to solicit strictly written responses from participants. Savvy researchers may find the structure of this software to be a valuable template for creating additional tasks such as the figural divergent thinking tasks used by Torrance (1974). An additional limitation is that Creative Task Creator does not allow for the specification of experimental conditions. Researchers who desire to introduce a manipulation into their study (e.g., instructional manipulations) should be able to do so with a bit of creativity and programming know-how. Specifically, researchers can create unique versions of the creativity tasks to correspond to the experimental conditions in the study and administer them to participants in a randomized or fixed order.

Our hope is that use of the Creative Task Creator will facilitate longitudinal research on creativity, research across cultures, and research with expert creators. Using this tool, researchers may find it easier to recruit individuals at multiple time points across development. A primary critique of divergent thinking measures of creativity has been their apparent lack of predictive validity (Plucker & Renzulli, 1999); therefore, longitudinal work is critical for establishing predictive validity of these creativity tasks.

The use of web-based creativity tasks may help to bridge geographical gaps that may stand in the way of increased understanding of creativity across cultures. Recent work has found that the effects of cultural factors on creativity do not parallel their effects on reasoning tasks (Niu, Zhang, & Yang, 2007). Using the Creative Task Creator, researchers can streamline the recruitment of participants from multiple international sites while maintaining a consistent research protocol and single database of responses.

Finally, another major challenge in the field has been access to eminent creators. Most research with highly creative individuals has relied primarily on case study methods (Czikszentmihalyi, 1996) and historiometric analyses (Simonton, 1999a). Simonton (1999b) advocated the expanded use of “significant samples,” samples including eminent individuals including those with great creative success. Web-based data collection may enable researchers to entice creators to complete some standardized measures for comparison with not-yet-eminent creators on their campuses. When researchers can compare eminent and typical individuals on the same task, more experimental work with eminent samples should be possible.

Conclusion

This tool for the creation of web-based creativity tasks should facilitate research in the field by expanding access to diverse samples, simplifying the processing of data, and facilitating the scoring process. The Creative Task Creator can be used to generate an infinite number of creativity tasks with written responses. We encourage researchers to take advantage of this versatility and to be creative in designing new tasks.

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Figure caption

Figure 1. *Creative Task Creator Interface.*

