

Peer Review Comments

Article: Elliott, B. L., & Brewer, G. A. (2019). Divided Attention Selectively Impairs Value-Directed Encoding. *Collabra: Psychology*, 5(1): 4. DOI: <https://doi.org/10.1525/collabra.156>

Article type: Original Research Report

Editor: Christopher Madan

Article submitted: 20 March 2018

Editor decision: Accept Submission

Revision submitted: 09 July 2018; 05 October 2018

Article accepted: 28 November 2018

Article published: 08 January 2018

Responses for Version 1

Reviewer 1:

1) General comments and summary of recommendation

Describe your overall impressions and your recommendation, including changes or revisions. Please note that you should pay attention to scientific, methodological, and ethical soundness only, not novelty, topicality, or scope. A checklist of things to you may want to consider is below:

- Are the methodologies used appropriate?
- Are any methodological weaknesses addressed?
- Is all statistical analysis sound?
- Does the conclusion (if present) reflect the argument, is it supported by data/facts?
- Is the article logically structured, succinct, and does the argument flow coherently?
- Are the references adequate and appropriate?:

The present paper examines how distraction during value-directed learning impacts memory outcomes. The basic task instructs participants to study items with different point values, and to earn as many points as possible by remembering those items during a later recognition test. Through a series of experiments, the authors introduce different distractor-tasks during learning. The main finding is that cognitively taxing distractors impair performance on subsequent recognition tasks.

This manuscript addresses a noteworthy gap in the literature, although I have some major concerns about this study; particularly concerns with the authors' interpretations:

1)

I'm unclear why the authors chose to frame these experiments within a dual-process framework. There is a notable body of literature disputing the validity of such models, and I do not believe the current study directly tests, or provides evidence for, dual-process theory.

However, the authors do interpret their study in this manner quite strongly: "Given support for the dual-process model in Experiment 1" (page 19), and "Our data clearly showed an effect of value on recollection alone across all three experiments" (page 20) are a few such examples. My question is: how do these results favor dual-process theory over alternative explanations, such as a more parsimonious continuous-strength explanation? Are these results explained equally well when the references to "recollection" are replaced with "strong-memories", and "familiarity" replaced with "weak-

memories"? Is this distinction ever tested directly, or is there any reason continuous-strength models cannot account for this data?

I do not understand how the current study's remember-know paradigm address these questions. Prior studies have demonstrated remember-know behavior is better explained by continuous-strength accounts (e.g. Rotello & Zeng (2008) Analysis of RT distributions in the remember—know paradigm), and I cannot see how the current data favors a dual-process explanation.

2)

Much of the introduction introduces these experiments as testing whether executive functioning or rehearsal underlies value-directed memory outcomes. Experiment 2 does address this dichotomy, although with some limitations addressed by the authors. Experiment 3 nicely controls for distractor difficulty, but I was not clear how this experiment tested the executive/rehearsal dichotomy.

Were the distractors in experiment 2 equated for difficulty? If not, it seems reasonable to wonder whether random-number generation is simply more difficult than repeating the same number over-and-over. The motivation for experiment 3 was then: "The logic here was to use divided attention tasks that placed relative demands on executive processes but no obvious demands on articulatory processes." (page 14). I think interpreting the results from experiments 2 and 3 in terms of distractor difficulty is straight-forward, but is there evidence that VDR depends more on executive functioning than rehearsal when controlling for distractor difficulty?

3)

Could the authors perform a recognition sensitivity analysis, or analyze the false alarms in more detail? I think that information is important given the task and reported false alarm rates. From my understanding, the best strategy for this task is to respond "old" to every test item. This would yield the most points every time (without penalties for false alarms), although responding this way is definitely not in the spirit of the task. The reported mean false-alarm rates show the participants did not employ this strategy, but there were still a substantial number of false-alarms. I think assessing the response criterion in some way would help better describe the memory-outcomes in these experiments.

4)

It seems the authors' interpretation relies somewhat heavily on null results. For instance in experiments 2 and 3, post-hoc t-tests showing no differences between high and low value items within a given distractor condition. Can the authors draw the same conclusions from positive test results (i.e. rejecting a null hypothesis)?

2) Figures/tables/data availability:

Please comment on the author's use of tables, charts, figures, if relevant. Please acknowledge that adequate underlying data is available to ensure reproducibility (see open data policies per discipline of Collabra here):

5)

This is more minor, but the manuscript can benefit from showing the data graphically in some way.

3) Ethical approval:

If humans or animals have been used as research subjects, and/or tissue or field sampling, are the necessary statements of ethical approval by a relevant authority present? Where humans have participated in research, informed consent should also be declared.

If not, please detail where you think a further ethics approval/statement/follow-up is required.:

Yes, the description is good.

4) Language:

Is the text well written and jargon free? Please comment on the quality of English and any need for improvement beyond the scope of this process.:

Yes, the text is well-written.

Reviewer 2:

1) General comments and summary of recommendation

Describe your overall impressions and your recommendation, including changes or revisions. Please note that you should pay attention to scientific, methodological, and ethical soundness only, not novelty, topicality, or scope. A checklist of things to you may want to consider is below:

- Are the methodologies used appropriate?
- Are any methodological weaknesses addressed?
- Is all statistical analysis sound?
- Does the conclusion (if present) reflect the argument, is it supported by data/facts?
- Is the article logically structured, succinct, and does the argument flow coherently?
- Are the references adequate and appropriate?:
- Are the methodologies used appropriate?

Yes

- Are any methodological weaknesses addressed?

Yes but see comments

- Is all statistical analysis sound?

Yes

It would be helpful to explain exactly how each of the hit rates was calculated. I assume this is correct- overall old response FA. For the Remember and Know hit rates are these technically the RCorr and or Kcorr (Familiarity-FamFA) in the Yonelinas model, or FCorr (KCorr-/1RCorr)? There are many ways these individual estimates could have been calculated. Similarly the overall hit rate could be composite score of these so it would be very helpful to clarify this.

- Does the conclusion (if present) reflect the argument, is it supported by data/facts?

Yes - see comments for improvement

- Is the article logically structured, succinct, and does the argument flow coherently?

Yes

- Are the references adequate and appropriate? *

Yes. The authors could also mention Middlebrooks, Kerr and Castel 2017 who looked at VDR and divided attention.

The authors report a set of 3 experiments to examine the effects of divided attention on encoding high and low value information. They also test whether this effect is limited to remember responses. The article is well written and structured and the introduction gives a solid review of previous work and current rationale. The experiments all support the conclusion that VDR increases recognition memory for high over low value items and this relies on executive processes. Understanding the mechanism behind VDR is an important question and I would recommend that this work be published provided the following concern is addressed.

My main concern here is the framing of the second research question. I can understand that researchers may wish to disassociate effects for remember and know responses but I think more consideration needs to be given to current debates surrounding this. For example, recent papers in this field have indeed examined these processes separately (e.g. Cohen et al., 2017) but others (e.g. Mason et al. 2017) have highlighted that both single and dual process models often account for the data in these types of experiments. This has been studied more broadly in the recognition memory literature (e.g. Dunn, 2004 and Malmberg, 2008) I think it would help to differentiate between recollection and familiarity and high and low confidence judgments, i.e single or dual process but potentially with the same results.

This becomes particularly evident in the Discussion section where I do not think there is sufficient evidence in the current literature to discuss the neural basis of a recollection response. I agree, particularly in this topic, it is interesting to discuss the potential neural mechanisms but I think this needs to be done more cautiously.

2) Figures/tables/data availability:

Please comment on the author's use of tables, charts, figures, if relevant. Please acknowledge that adequate underlying data is available to ensure reproducibility (see open data policies per discipline of Collabra here):

The main results table is clear. Although it isn't necessary I would consider including some plots for the key results in experiments.

I realise it's not a requirement but it would be nice if the authors made the data publicly available (e.g. on OSF).

3) Ethical approval:

If humans or animals have been used as research subjects, and/or tissue or field sampling, are the necessary statements of ethical approval by a relevant authority present? Where humans have participated in research, informed consent should also be declared.

If not, please detail where you think a further ethics approval/statement/follow-up is required.:

I'm sure that ethics approval and consent were obtained, but I cannot see a statement in the manuscript referring to either of these.

4) Language:

Is the text well written and jargon free? Please comment on the quality of English and any need for improvement beyond the scope of this process.:

I thought the writing was very clear, in particular I felt the introduction was well written covered the literature well.

Reviewer 3:

1) General comments and summary of recommendation

Describe your overall impressions and your recommendation, including changes or revisions. Please note that you should pay attention to scientific, methodological, and ethical soundness only, not novelty, topicality, or scope. A checklist of things to you may want to consider is below:

- Are the methodologies used appropriate?
- Are any methodological weaknesses addressed?
- Is all statistical analysis sound?
- Does the conclusion (if present) reflect the argument, is it supported by data/facts?
- Is the article logically structured, succinct, and does the argument flow coherently?
- Are the references adequate and appropriate?:

Elliot and Brewer present data investigating how divided attention influences value-directed memory encoding. The authors perform a value-directed remembering paradigm, in which different point values are associated with later successful recognition of words. The authors study how these pro-

cesses are influenced with dual tasks that selectively disrupt phonological processes, or those that interfere with general executive function. The authors show a consistent pattern of better memory for high value information, that is related to Recollection rather than Familiarity processes. Further, they show that manipulations that utilize executive resources, but not phonological processes, disrupt these recollection benefits. The study is timely, well-designed and theoretically sound. The authors do a commendable job reviewing the previous literature, and connecting their results to a broader literature. Further, the authors analysis strategies are well-executed, and the findings are robust. There were a few minor weaknesses to the paper, which can be easily addressed. I detail these below:

Comment 1: The authors do a great job reviewing how articulatory suppression disrupts phonological processing in the introduction, but less attention is paid to the disruption by the divided attention tasks. If the authors could expand upon what time of executive functions random number generation and tone detection influences, it would enhance the broader impact of the manuscript.

Comment 2: A few studies investigating strategy use in similar paradigms have influenced time as a moderating factor. In these studies, particularly those that use study test intervals, the influence of value becomes larger in time. Albeit not necessary, understanding how the authors manipulations influenced the generation fo strategy over time would help connect the current findings with the broader literature.

Comment 3: One particular confound in the interpretation of the data is that the articulatory suppression task is less taxing to a general executive system then the number generation and tone detection tasks. Could the authors address this issue in the discussion section.

2) Figures/tables/data availability:

Please comment on the author's use of tables, charts, figures, if relevant. Please acknowledge that adequate underlying data is available to ensure reproducibility (see open data policies per discipline of Collabra here):

The Table is highly informative, and provides all the necessary data to address the findings.

3) Ethical approval:

If humans or animals have been used as research subjects, and/or tissue or field sampling, are the necessary statements of ethical approval by a relevant authority present? Where humans have participated in research, informed consent should also be declared.

If not, please detail where you think a further ethics approval/statement/follow-up is required:

Everything seems to meet standards of ethical approval.

4) Language:

Is the text well written and jargon free? Please comment on the quality of English and any need for improvement beyond the scope of this process.:

The paper is extremely well written.

Editor Decision for Version 1

Editor: Dr Christopher R Madan

Affiliation: University of Nottingham, UK

Editor decision: Revisions Required

Decision date: 09 May 2018

Dear Dr Gene Brewer,

After review, we have reached a decision regarding your submission to *Collabra: Psychology*, "Divided Attention Selectively Impairs Value-Directed Encoding". Our decision is to request revisions of the manuscript prior to acceptance for publication.

All three reviewers, as well as myself, found the work to generally well done and to ask interesting research questions. That said, improvements are needed to motivate the current dual-process approach and to clarify how the recognition analyses were conducted. Additionally, more discussion regarding the divided attention tasks and how they are being thought to influence executive function. The full reviews are included in this email.

To access your submission account, follow the below instructions:

- 1) login to the journal webpage with username and password
- 2) click on the submission title
- 3) click 'Review' menu option
- 4) download Reviewed file and make revisions based on review feedback
- 5) upload the edited file
- 6) Click the 'notify editor' icon and email the confirmation of re-submission and any relevant comments to the journal.

Please ensure that your revised files adhere to our author guidelines, and that the files are fully copyedited/proofed prior to upload. Please also ensure that all copyright permissions have been obtained. This is the last opportunity for major editing, therefore please fully check your file prior to re-submission.

If you have any questions or difficulties during this process, please do contact us.

Please could you have the revisions submitted by July 31, 2018. If you cannot make this deadline, please let us know as early as possible.

Kind regards,

Dr Christopher R Madan

University of Nottingham

christopher.madan@nottingham.ac.uk

Author's Response to Review Comments for Version 1

Author: Gene A. Brewer

Affiliation: Arizona State University, Tempe, Arizona, US

Revision submitted: 09 July 2018

We have resubmitted our manuscript regarding the effects of divided attention on value-directed remembering.

Thanks for this opportunity and we look forward to hearing about the your eventual decision.

Warm Regards,

Gene

Attached document:

https://s3-eu-west-1.amazonaws.com/ubiquity-partner-network/ucp/journal/collabra/Coll-156-rd1_resp.zip

Responses for Version 2

Reviewer 1:

1) General comments and summary of recommendation

Describe your overall impressions and your recommendation, including changes or revisions. Please note that you should pay attention to scientific, methodological, and ethical soundness only, not novelty, topicality, or scope. A checklist of things to you may want to consider is below:

- Are the methodologies used appropriate?
- Are any methodological weaknesses addressed?
- Is all statistical analysis sound?

- Does the conclusion (if present) reflect the argument, is it supported by data/facts?
- Is the article logically structured, succinct, and does the argument flow coherently?
- Are the references adequate and appropriate?:

1) I think the authors clarified the dual-process interpretations well. I also appreciate adding the Wixted review on this topic for readers.

2) The motivation and interpretation for experiment 3 has been better clarified.

3) The penalty for false alarms is clear now.

It would be nice if supplementary table 1 presented SDT statistics with respect to remember and know responses (as in the manuscript's Table 1), since much of the study concerns that remember/know distinction. This doesn't seem critical since the authors replicated their analyses with false alarm correction. However, it would be interesting to know whether there are meaningful changes in response criteria across these experiments.

4) I appreciate the edits clarifying the interaction results.

2) Figures/tables/data availability:

Please comment on the author's use of tables, charts, figures, if relevant. Please acknowledge that adequate underlying data is available to ensure reproducibility (see open data policies per discipline of Collabra here):

It would be nice if supplementary table 1 presented SDT statistics with respect to remember and know responses (as in the manuscript's Table 1), since much of the study concerns that remember/know distinction. This doesn't seem critical since the authors replicated their analyses with false alarm correction. However, it would be interesting to know whether there are meaningful changes in response criteria across these experiments.

3) Ethical approval:

If humans or animals have been used as research subjects, and/or tissue or field sampling, are the necessary statements of ethical approval by a relevant authority present? Where humans have participated in research, informed consent should also be declared.

If not, please detail where you think a further ethics approval/statement/follow-up is required.:

Yes

4) Language:

Is the text well written and jargon free? Please comment on the quality of English and any need for improvement beyond the scope of this process.:

Minor typo on page 16, should be "judgment type is summarized in Table 1". The numbering was left out.

Reviewer 2:

1) General comments and summary of recommendation

Describe your overall impressions and your recommendation, including changes or revisions. Please note that you should pay attention to scientific, methodological, and ethical soundness only, not novelty, topicality, or scope. A checklist of things to you may want to consider is below:

- Are the methodologies used appropriate?
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- Is all statistical analysis sound?
- Does the conclusion (if present) reflect the argument, is it supported by data/facts?
- Is the article logically structured, succinct, and does the argument flow coherently?
- Are the references adequate and appropriate?:

The reviewers have made changes to improve the manuscript from the previous submission and have adequately addressed all of the concerns I raised in my review.

Whilst I personally would prefer even less of an emphasis on the dual-process account - its inclusion is now better motivated and the claims made are within the scope of the paper.

2) Figures/tables/data availability:

Please comment on the author's use of tables, charts, figures, if relevant. Please acknowledge that adequate underlying data is available to ensure reproducibility (see open data policies per discipline of Collabra here).:

Yes

3) Ethical approval:

If humans or animals have been used as research subjects, and/or tissue or field sampling, are the necessary statements of ethical approval by a relevant authority present? Where humans have participated in research, informed consent should also be declared.

If not, please detail where you think a further ethics approval/statement/follow-up is required.:

Yes

4) Language:

Is the text well written and jargon free? Please comment on the quality of English and any need for improvement beyond the scope of this process.:

Yes

Reviewer 3:

1) General comments and summary of recommendation

Describe your overall impressions and your recommendation, including changes or revisions. Please note that you should pay attention to scientific, methodological, and ethical soundness only, not novelty, topicality, or scope. A checklist of things to you may want to consider is below:

- Are the methodologies used appropriate?
- Are any methodological weaknesses addressed?
- Is all statistical analysis sound?
- Does the conclusion (if present) reflect the argument, is it supported by data/facts?
- Is the article logically structured, succinct, and does the argument flow coherently?
- Are the references adequate and appropriate?:

The authors did a commendable job addressing my concerns as well as the other authors in the revised manuscript. I am enthusiastic about the manuscript, and believe it makes a nice contribution to a growing field. However, I had a few remaining minor comments that I believe should be easily addressable.

1. The authors include my requested analyses of value effects over time, which I found to be quite interesting. However, they only ran this analysis on Experiment 1, and there is no reference/discussion of the analysis. If the authors' believe these analyses are orthogonal to their research question, in line with an open science/planned analyses framework, I invite them to remove them from the manuscript. However, if the authors think it is within the scope of their study, they should repeat these analyses across all three experiments, and discuss them.

2. I apologize for not raising this concern in the first round of reviews, but I didn't notice it until this current revision. In Experiment 2, one would expect a main effect of distractor type on 'know' responses, given the prior literature on articulatory suppression. The authors already provided some caution about interpreting the results of the AS manipulation, but given the negative finding on 'know results' the approach may have been insufficient to properly tax the phonological system.

2) Figures/tables/data availability:

Please comment on the author's use of tables, charts, figures, if relevant. Please acknowledge that adequate underlying data is available to ensure reproducibility (see open data policies per discipline of Collabra here):

I really appreciate the additional figure.

3) Ethical approval:

If humans or animals have been used as research subjects, and/or tissue or field sampling, are the necessary statements of ethical approval by a relevant authority present? Where humans have participated in research, informed consent should also be declared.

If not, please detail where you think a further ethics approval/statement/follow-up is required:

Ethics seem good to me.

4) Language:

Is the text well written and jargon free? Please comment on the quality of English and any need for improvement beyond the scope of this process:

Yes

Editor Decision for Version 2

Editor: Dr Christopher R Madan

Affiliation: University of Nottingham, UK

Editor decision: Revisions Required

Decision date: 20 September 2018

Dear Dr Gene Arnold Brewer,

After review, we have reached a decision regarding your submission to Collabra: Psychology, "Divided Attention Selectively Impairs Value-Directed Encoding". Our decision is to request revisions of the manuscript prior to acceptance for publication.

I apologize for the delay in sending this decision letter, the reviewers were relatively prompt, but I myself had been a bit overwhelmed with tasks after returning from holiday. The reviewers were all quite satisfied with your revisions, but Reviewers 1 and 3 make some minor suggestions that would be good to address before the paper is accepted. These are all very minor, so there will be no reason to solicit further reviews after the revised manuscript is submitted. Great work with the revisions!

To access your submission account, follow the below instructions:

- 1) login to the journal webpage with username and password
- 2) click on the submission title
- 3) click 'Review' menu option
- 4) download Reviewed file and make revisions based on review feedback
- 5) upload the edited file
- 6) Click the 'notify editor' icon and email the confirmation of re-submission and any relevant comments to the journal.

Please ensure that your revised files adhere to our author guidelines, and that the files are fully copyedited/proofed prior to upload. Please also ensure that all copyright permissions have been obtained. This is the last opportunity for major editing, therefore please fully check your file prior to re-submission.

If you have any questions or difficulties during this process, please do contact us.

Please could you have the revisions submitted by the end of October. If you cannot make this deadline, please let us know as early as possible.

Kind regards,

Dr Christopher R Madan

University of Nottingham

christopher.madan@nottingham.ac.uk

Author's Response to Review Comments for Version 1

Author: Gene A. Brewer

Affiliation: Arizona State University, Tempe, Arizona, US

Revision submitted: 05 October 2018

We have uploaded our changes to this manuscript along with a letter detailing our response to the reviewers.

Thank you for the opportunity to publish in this special issue in Collabra.

Gene and Blake

Attached document:

https://s3-eu-west-1.amazonaws.com/ubiquity-partner-network/ucp/journal/collabra/Coll-156-rd2_resp.zip

Editor Decision for Version 3

Editor: Dr Christopher R Madan
Affiliation: University of Nottingham, UK
Editor decision: Accept Submission
Decision date: 28 November 2018

Dear Gene,

Thank you for submitting your manuscript, entitled "Divided Attention Selectively Impairs Value-Directed Encoding" for publication in Collabra: Psychology. I am pleased with your revisions and am happy to accept your submission for publication, pending the completion of copyediting and formatting.

As there are no further reviewer revisions to make, you do not have to complete any tasks at this point. The accepted submission will now undergo final copyediting. You will be contacted once this is complete to answer any queries that may have arisen during copyediting and to allow a final chance to edit the files prior to typesetting. If you wish to view your submission during this time, you can log in via the journal website.

Kind regards,

Dr Christopher R Madan
University of Nottingham
christopher.madan@nottingham.ac.uk