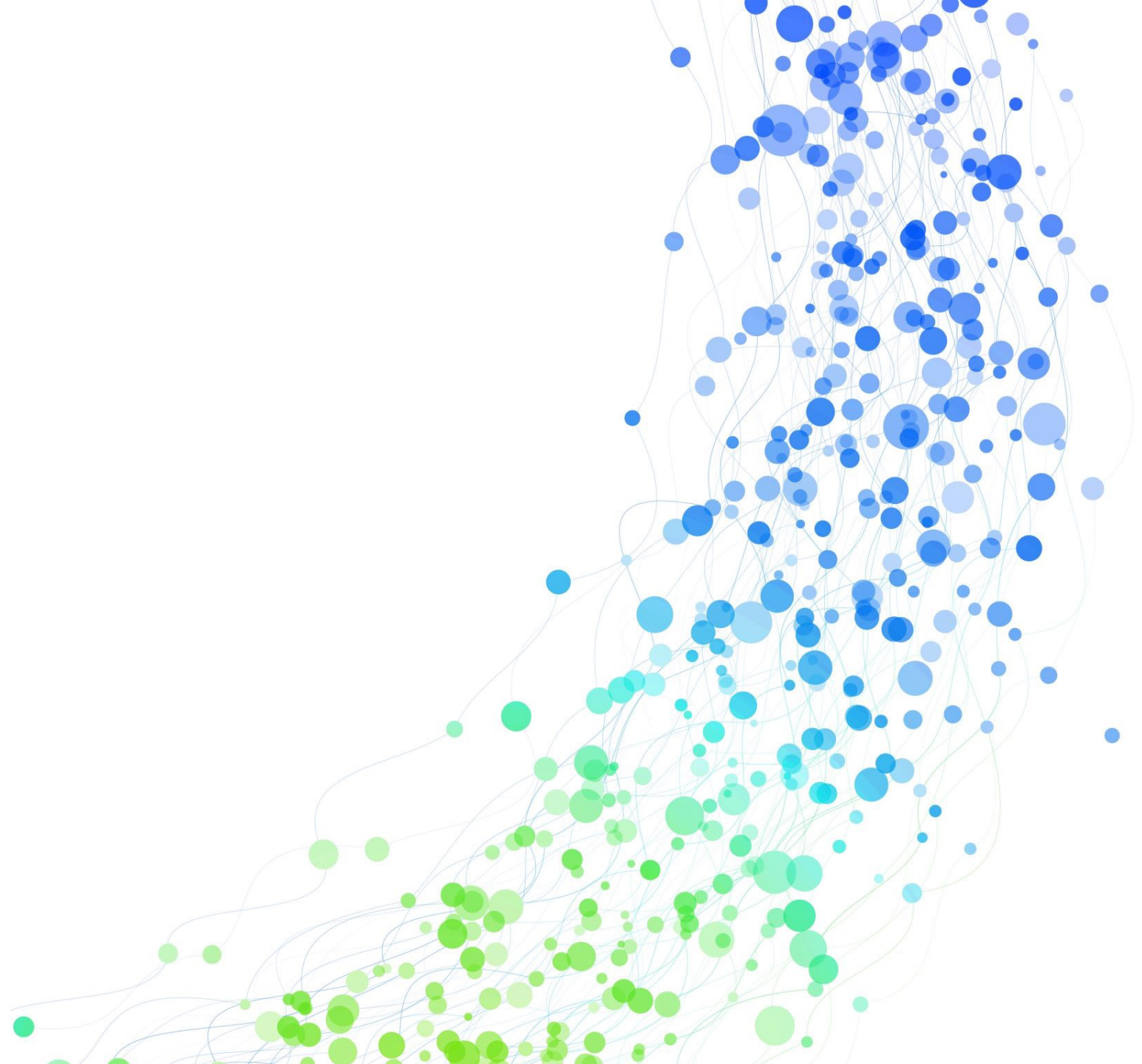


**METRICS OF ADAPTATION
AFTER LOSS
OR
TRANSLATIONAL
MARKERS OF
INTEGRATED GRIEF/
ADAPTIVE FUNCTIONING**

Mary-Frances O'Connor, PhD

Psychology Department
University Of Arizona



GRIEF ELICITATION NEUROIMAGING TASK

PICTURE

Deceased

Stranger

WORD

Grief-related



Neutral



VALIDATION OF GRIEF ELICITATION

FIGURE 2. Subjective Grief Ratings by Eight Bereaved Women Viewing Pictures and Words Related or Unrelated to the Deceased Relative^a

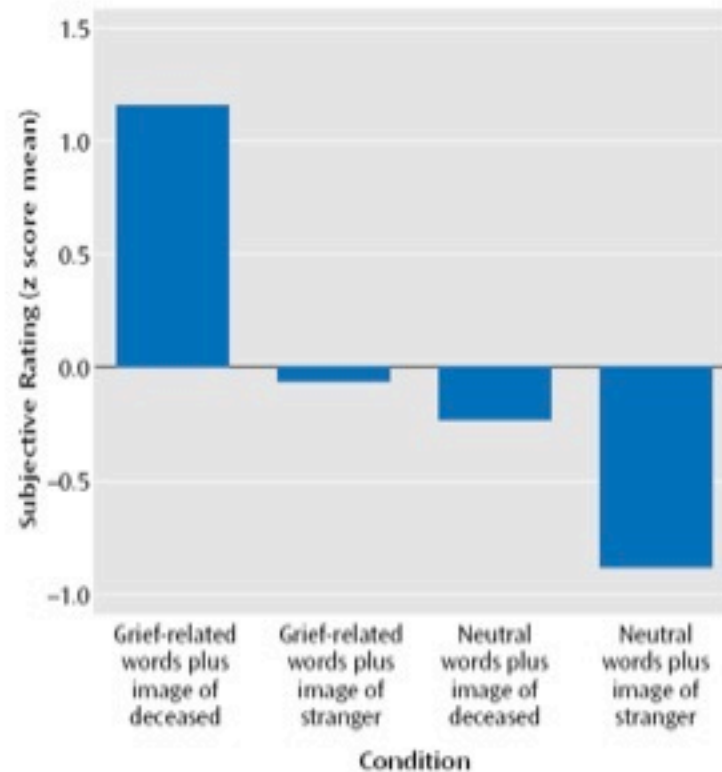
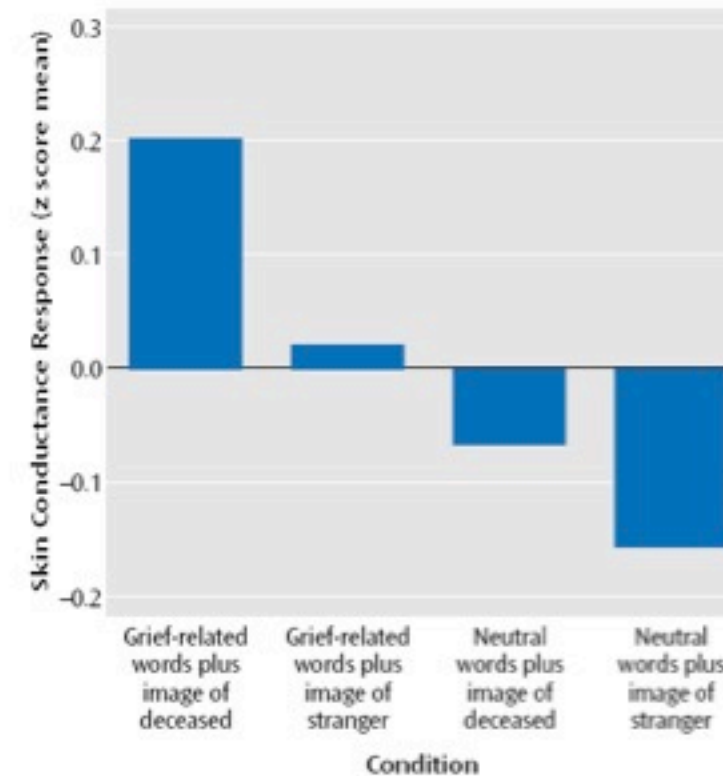
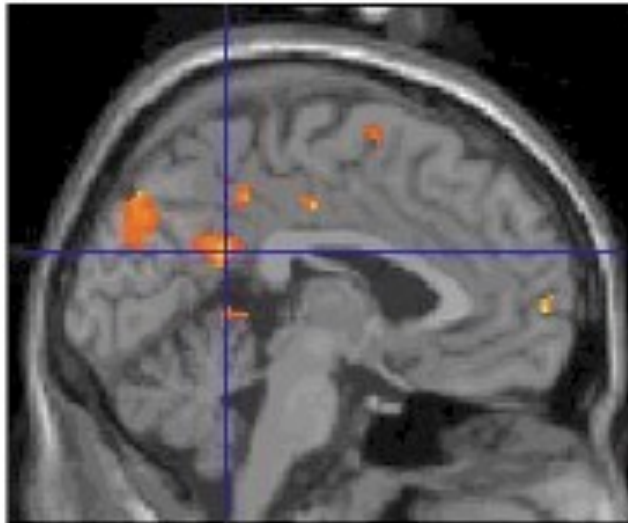


FIGURE 1. Skin Conductance Responses of Eight Bereaved Women Viewing Composites of Pictures and Words Related or Unrelated to the Deceased Relative^a

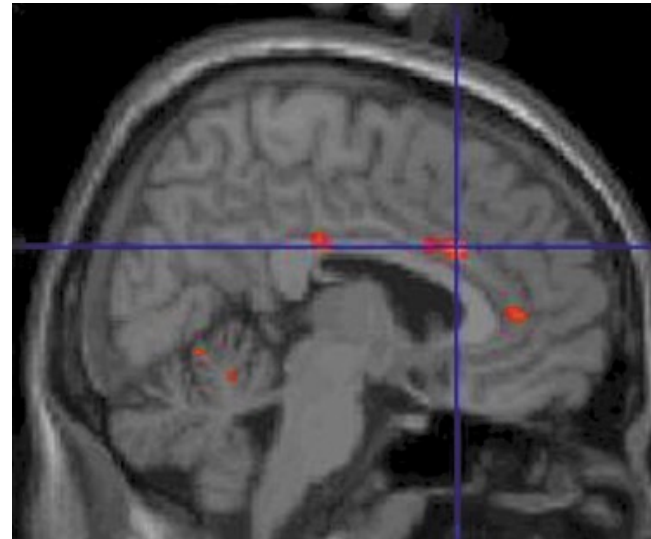


SEPARATE REGIONS: MEMORIES OF THE DEATH (WORD) VS ATTACHMENT BOND (PERSON)

Word contrast



Person contrast



1ST LESSON LEARNED

First, this study elicited grief, and many of my research questions were about grieving.

- We might hypothesize that activation in brain regions would change over time, perhaps a **decrease in nucleus accumbens activation while learning** that the deceased is really gone.
- But this remains a hypothesis without longitudinal study: Individual difference in nucleus accumbens activation might be **high in acute grief** (even prior to loss) and **remain elevated across time**.
- We don't know if PGD is like extended acute grief, or can be detected earlier in the encoding of the attachment bond.





2ND LESSON LEARNED

Second, the passive response to eliciting a wave of grief did not image how grief might influence other mental functions, like attention, memory, sense of self, etc.

Passive tasks are important for attachment response.

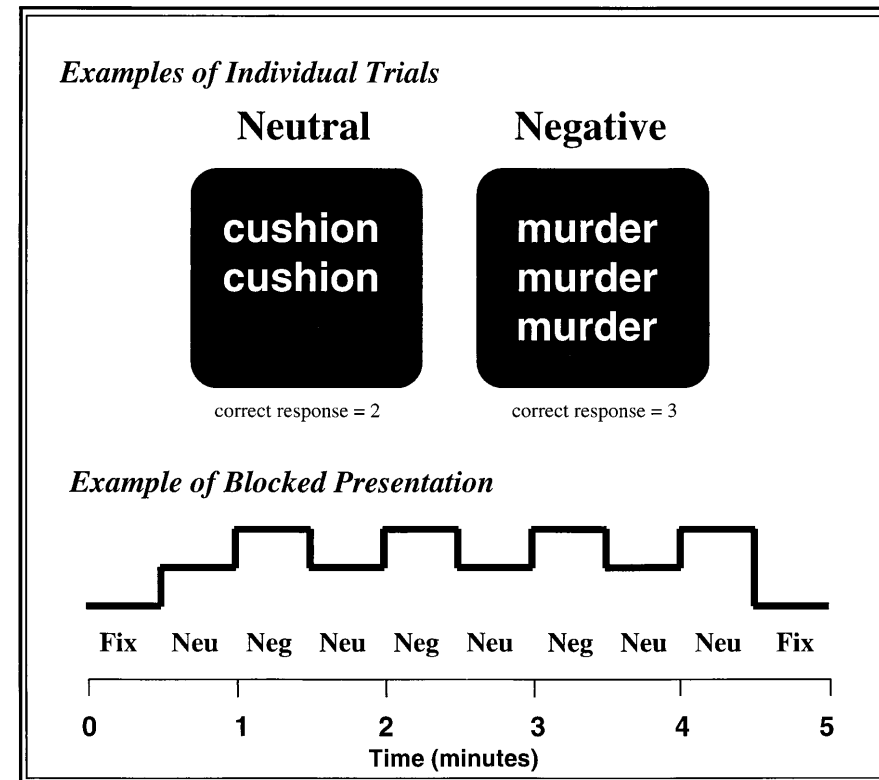
But I also turned to tasks which still focused on grief instead of grieving, but elicited specific mental functions.

- Emotional Counting Stroop Task
- Approach Avoidance Task

EMOTIONAL COUNTING STROOP: LEARNING IN ONE SESSION

The emotional-counting Stroop can be used in the neuroimaging scanner.

If the problem in grieving is the failure to learn that the deceased is really gone and what that means for our lives, could we capture learning during a single laboratory session?



Whalen et al., *Biol Psychiatry*, 1998

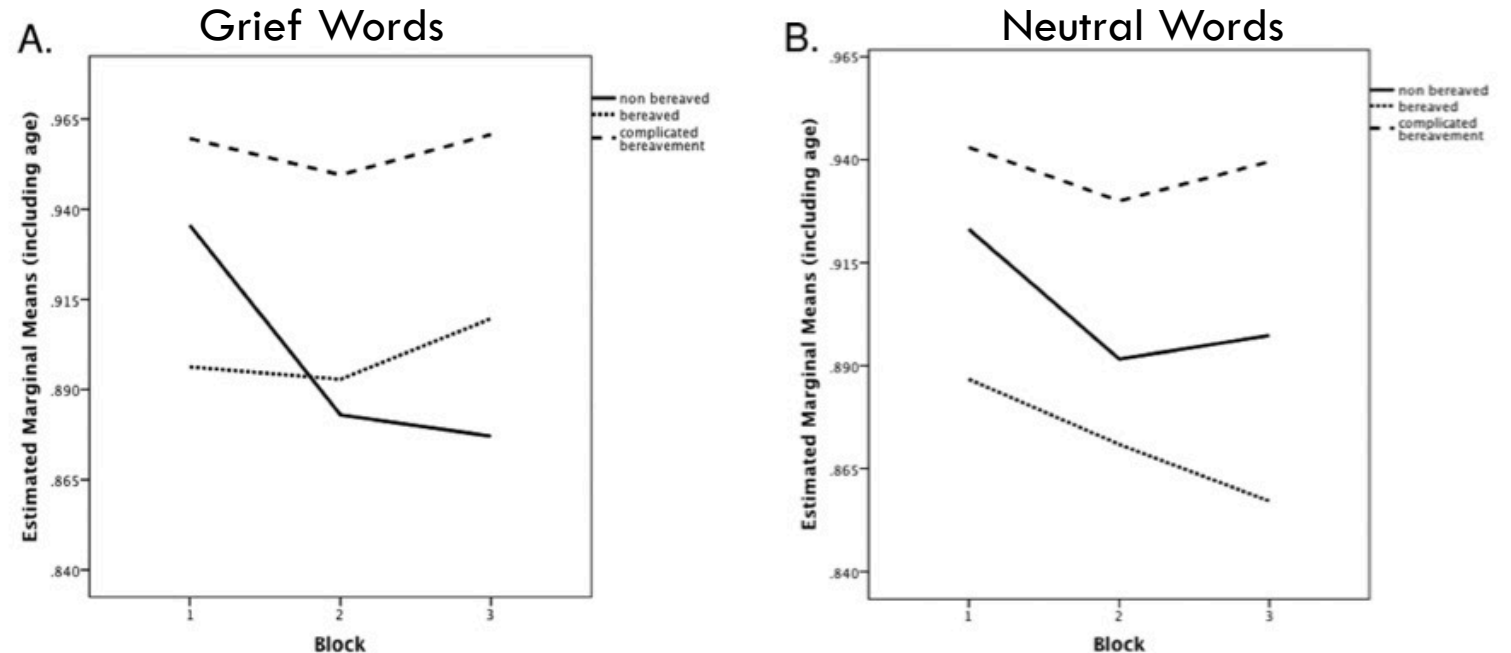
EMOTIONAL COUNTING STROOP: LEARNING IN ONE SESSION

The ec-Stroop made us realize the problem with PGD might be about:

inability to learn (domain general),

or distraction slowing one's reaction time,

or it might be about unwillingness to reject the deceased loved one (to make the stimuli move off the screen).



GONE BUT ALSO EVERLASTING HYPOTHESIS

On the one hand, you have a memory of that the loved one has died (gone).

On the other hand, you have attachment neurobiology, with the implicit belief or semantic knowledge that the attachment figure is everlasting.

The conflict between these two streams of information prevents learning that they are really gone and what that means for your life, prevents you from updating your model of the world.



REWARD LEARNING TASKS?

If learning that an attachment figure is really gone (grieving) means no longer seeking out the reward associated with the deceased, how do we test whether that learning has happened?

If the bereaved choose another partner, this is one metric, like voles.

In humans, there may be finer-grained metrics that this learning has happened.

Is the loved one the reward? Are we working in order to obtain the reward of the deceased loved one? (Approach Avoid Task)

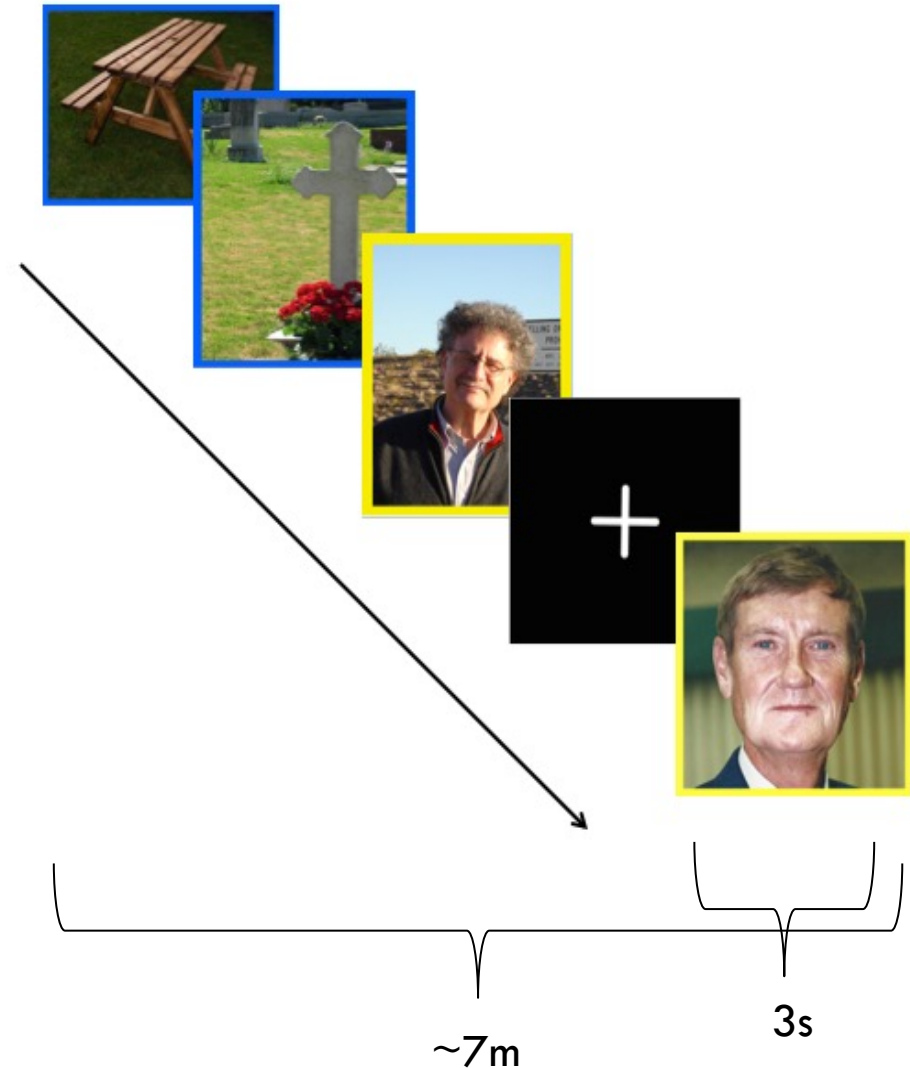
Or does the reward associated with the deceased loved one simply distract us when our attention is needed elsewhere to perform daily activities? (Stroop)

Or can we not bear to choose something other than the deceased loved one, to turn away, since if we believe they are everlasting, we would be rejecting our one-and-only? (Forced choice)

APPROACH AVOIDANCE TASK

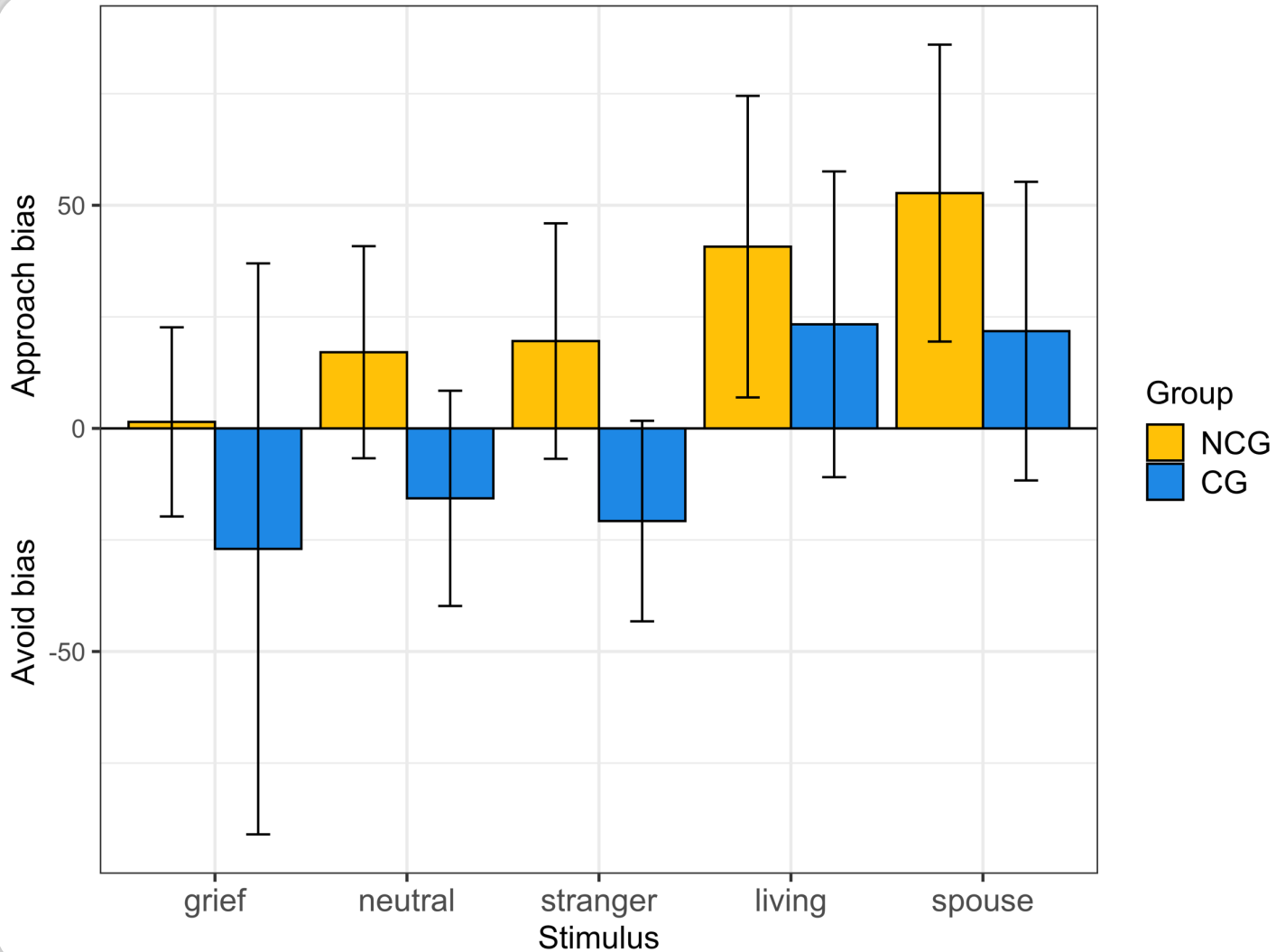
Stimuli

- Deceased
- Living loved one
- Stranger
- Grief (generic)
- Neutral





Arizmendi et al, 2023, *Eur J Trauma & Dissociation*



PROLONGED GRIEF SHOWS LESS APPROACH BIAS OVERALL

Those with PGD seek reminders of the deceased but avoid reminders of the death or their grief.

Overall, the CG group showed less approach bias regardless of stimulus category

We hypothesized that the contrast of **spouse vs. stranger** would produce a greater response bias than the contrast of **non-specific grief vs. neutral**. To test this hypothesis, we analyzed the difference between the two contrast estimates (spouse vs. stranger and non-specific grief vs. neutral).

The contrast comparisons indicated that participants showed significantly more approach bias on spouse vs. stranger trials, whereas response bias did not significantly differ in non-specific grief trials vs. neutral trials.

Contrast			estimate	SE	df	<i>t</i>	<i>p</i>
neutral	-	generic grief	13.74	16.40	38	0.84	0.408
neutral	-	living	-30.35	11.10	38	-2.73	0.077
neutral	-	spouse	-36.45	11.90	38	-3.07	0.035
neutral	-	stranger	0.81	11.30	38	0.07	1.000
generic grief	-	living	-44.09	17.60	38	-2.51	0.099
generic grief	-	spouse	-50.19	18.90	38	-2.66	0.080
generic grief	-	stranger	-12.94	16.50	38	-0.78	1.000
living	-	spouse	-6.10	14.30	38	-0.43	1.000
living	-	stranger	31.15	13.80	38	2.25	0.151
spouse	-	stranger	37.26	10.60	38	3.51	0.012

IS THE PROBLEM APPROACH OR AVOID?

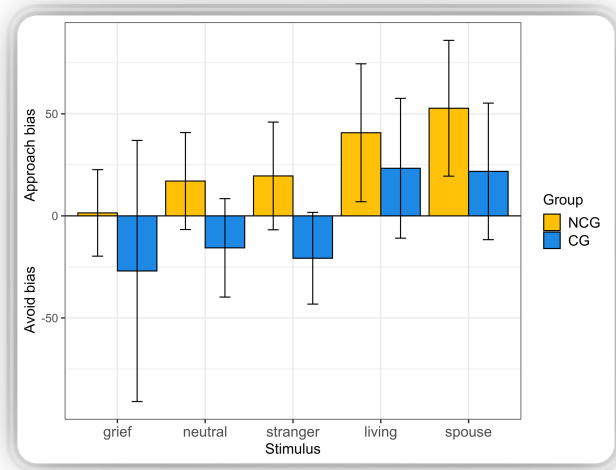
Our results indicate that widowed older adults show different approach/avoid biases depending on whether the “grief-related” stimulus is a personal photo of the deceased, or a non-specific reminder of death (such as a photo of a casket).

Participants broadly demonstrated a greater approach bias for the spouse compared to non-specific grief images. Thus, conflicting accounts of approach/avoidance in PGD could be reconciled by **considering the targets of that behavior**.

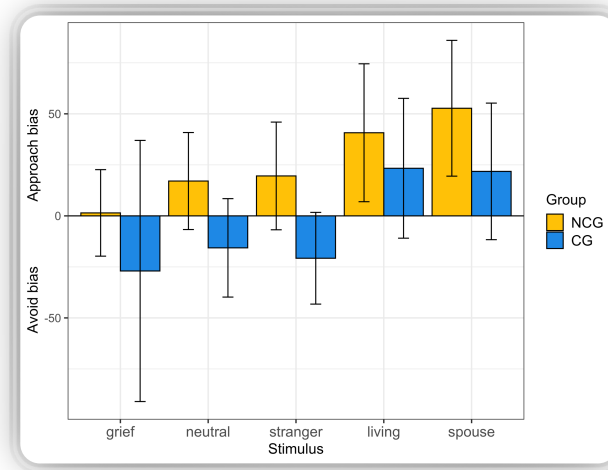
For example, a person might be motivated to engage in proximity-seeking behavior (e. g., reminiscence) when reminded of their deceased loved one, and also motivated to avoid confronting the reality of their death (as in the rumination-as-avoidance hypothesis).

Differential response results also corroborate Eisma and colleagues’ (Eisma et al., 2015) finding that rumination was only predictive of avoidance when photos of the deceased were paired with grief-related (e.g., “dead”), but not when photos of the deceased were paired with neutral words.

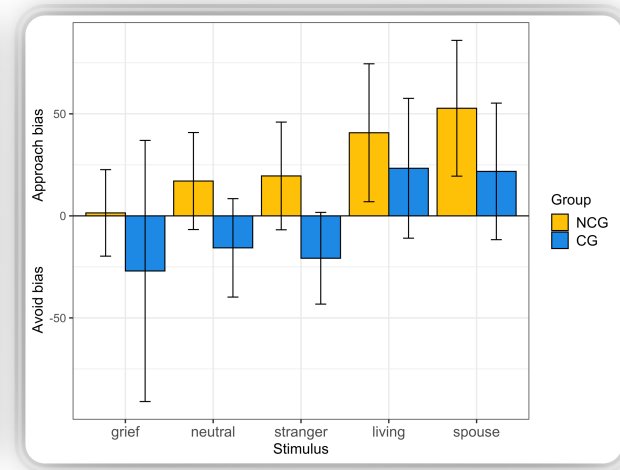
Understanding whether approach/avoid motivation changes over time (during grieving) is an unanswered question.



TIME 1



TIME 2



TIME 3

**ARIZMENDI ET AL., 2023 IS STILL A GRIEF STUDY,
NOT A STUDY OF GRIEVING**

2ND LESSON LEARNED

Individual difference in nucleus accumbens activation might be **high in acute grief** (even prior to loss) and **remain elevated across time**.

We don't know if PGD is like extended acute grief, or can be detected earlier in the encoding of the attachment bond.

Perhaps individual differences in neurobiological factors exist.

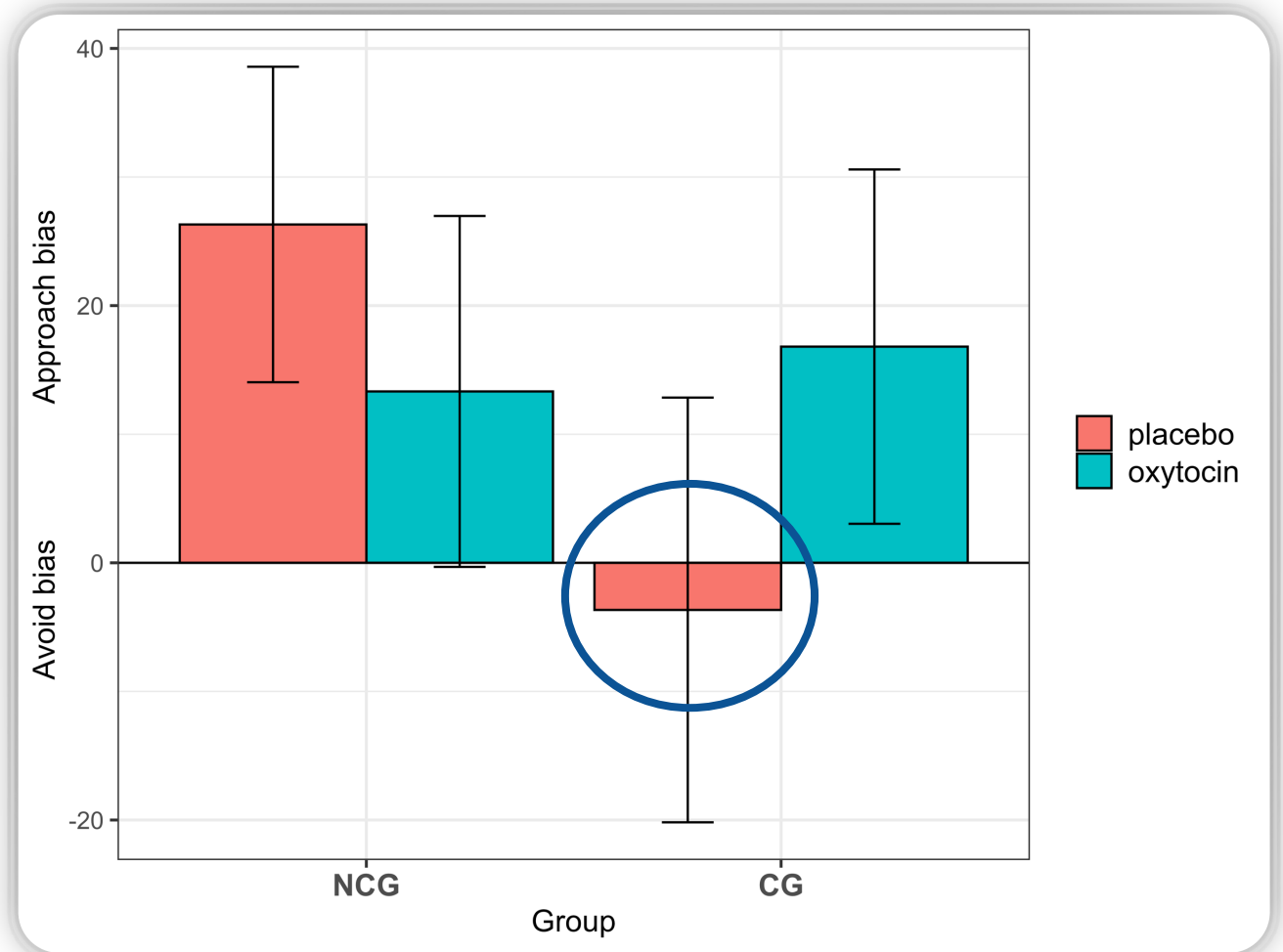


DIFFERENTIAL IMPACT OF OXYTOCIN ON PROLONGED GRIEF

In the placebo condition, across all stimuli, the PGD group was significantly more avoidance-biased.

The PGD group became significantly more approach-biased under oxytocin.

Individual difference: NAcc could have more receptors in PGD, could have more affinity, or could be less plastic to change during grieving.





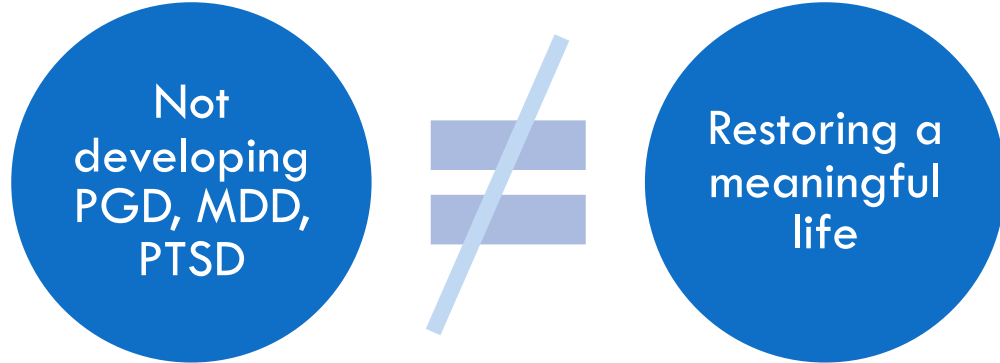
FINAL LESSON LEARNED

The studies so far are investigating coping with loss-oriented stressors, such as emotion regulation in the face of waves of grief, approach motivation to mentalization of the deceased, etc.

What about restoration-oriented stressors/tasks?

Is avoidance the same as lack of exploration, a motivational system potentially undermined by the lack of an attachment figure as a secure base?

MENTAL HEALTH IS NOT THE ABSENCE OF MENTAL ILLNESS



Mental health is a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community (World Health Organization, [Mental health atlas 2020](#)).

WITH GRATITUDE...

- National Institutes on Aging (NIA)
- DANA Foundation
- California Breast Cancer Program
- Retirement Research Foundation
- Institute for Mental Health Research

Trainees

Christian Schultze-Florey
Austin Grinberg
Brian Arizmendi
Lindsey Knowles
Mairead McConnell
Saren Seeley
Eva-Maria Stelzer
Sebastian Karl

Roman Palitsky
Deanna Kaplan
Monica Fallon
Vincent Goldberg
Da'Mere Wilson
Jiah Yoo
Sydney Friedman
Colin Tidwell

