CLASSIFICATION AND RFT: AN APPLICATION

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CLASSIFICATION

➤ Stimuli are considered to be part of a class when a common set of responses are emitted in their presence (Barnes-Holmes, Hayes, Damond & O'Hora, 2001).

   ➤ Perceptual classes (physical properties - e.g., Gelman & Meyer, 2011).

   ➤ Associative classes (abstract - e.g., Galizio, Stewart & Pilgrim, 2001).

   ➤ Natural language classes (both abstract and physical - e.g., Adams, Fields & Verhave, 1993).

➤ Such an understanding of classification responses clearly adheres to an RFT-based framework cognition and behaviour including both arbitrary and non-arbitrary aspects.

➤ Classes are themselves categorised into higher order classes.

➤ A further step in the classification repertoire- extending beyond mutually entailed relationships and considering combinatorially entailed networks.

➤ Potentially, due to its' complexity, hierarchical classification has gained less research attention than that of basic classification.

➤ Within RFT, it has been conceptualised and modelled as patterns of relational framing - specifically containment and hierarchy (Gil, Luciano, Ruiz & Valdivia-Salas, 2012; Mulhern, Stewart & McElwee, 2017, 2018; Slattery & Stewart, 2014).
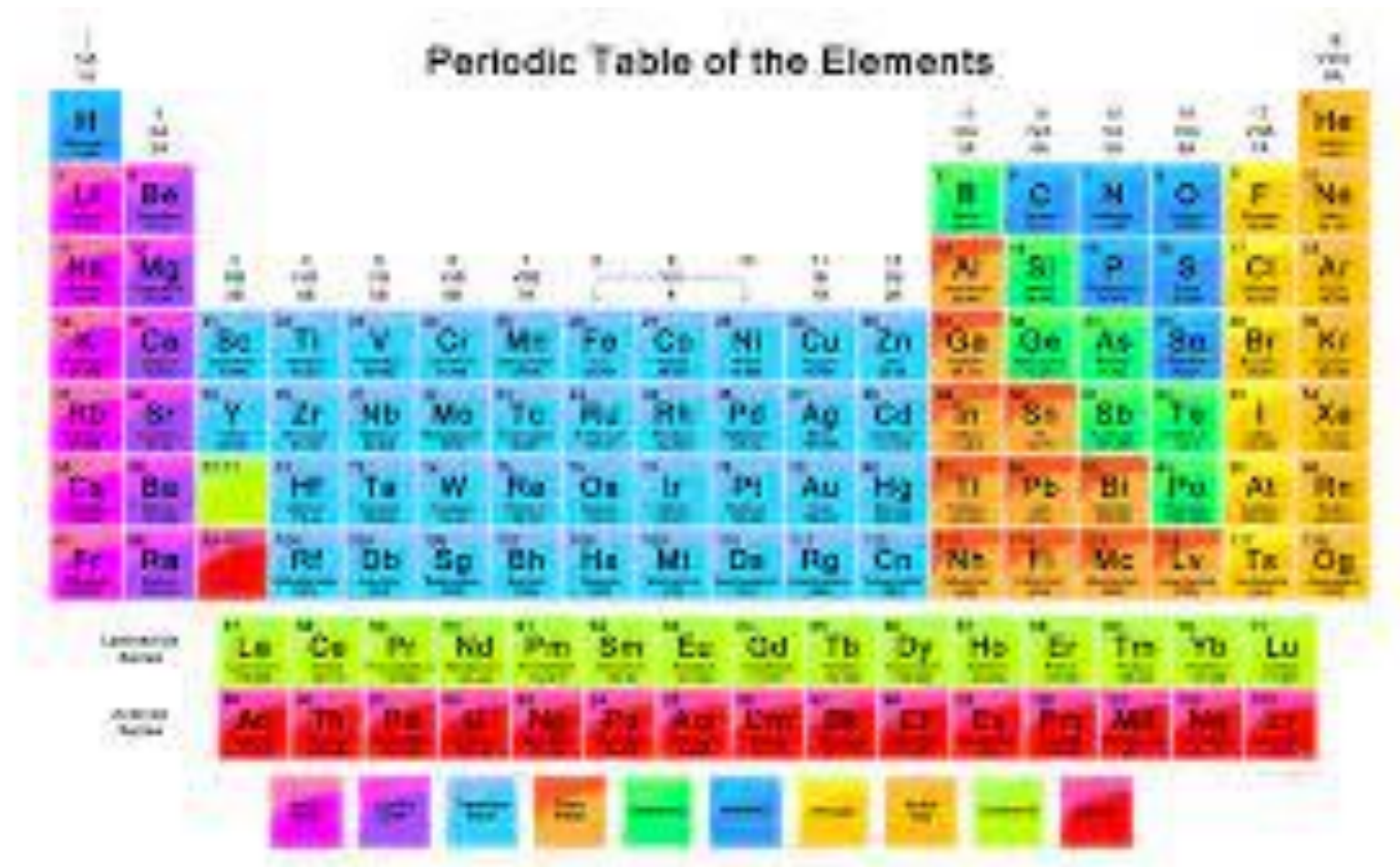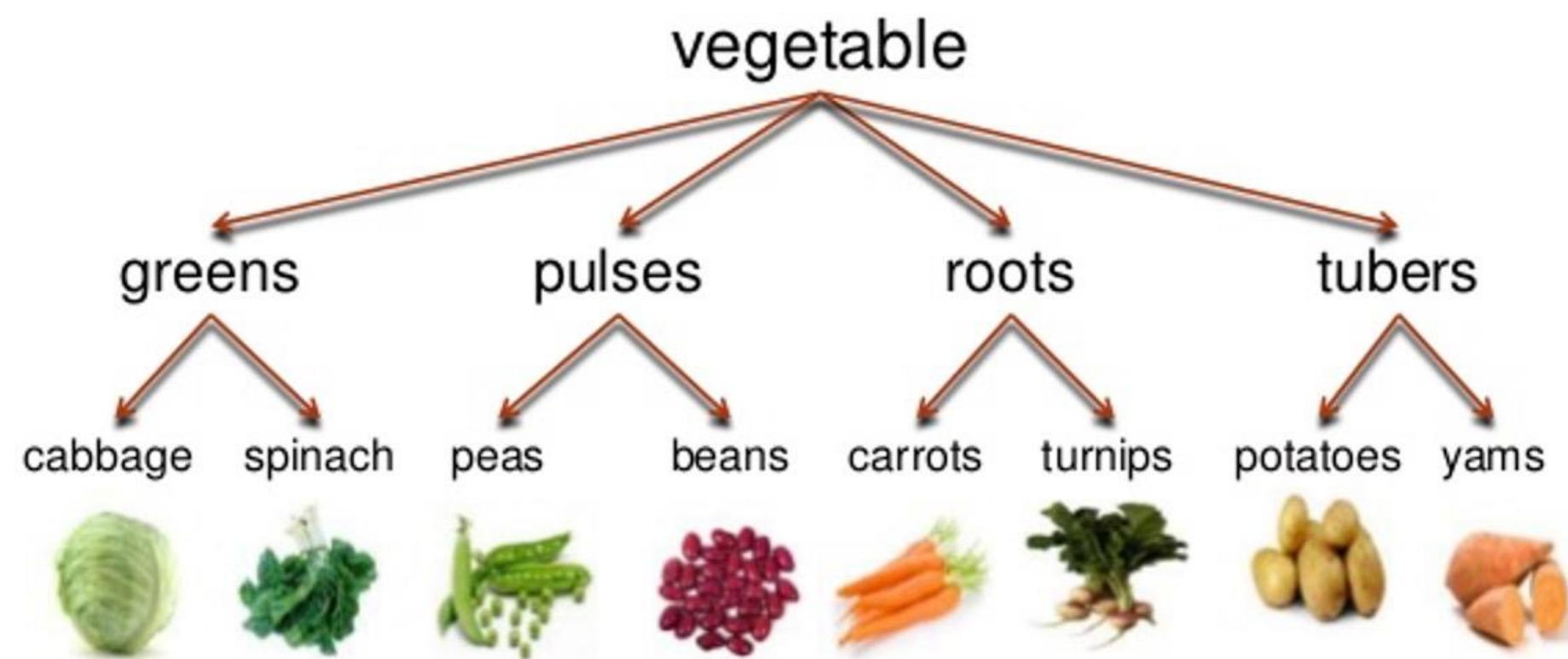
HIERARCHICAL CLASSIFICATION AND RFT

➤ Containment (Non-Arbitrary):

  ➤ E.g., when presented with a container and the contained material - "The water is **in** the glass. What does the glass **contain**?"

➤ Containment (Arbitrary):

  ➤ E.g., When there are no stimuli presented "The coin is **in** the box. What does the box **contain**?"

➤ Hierarchy (Arbitrary):

  ➤ E.g., "A lion is a **type of** animal. Does the class "animals" **contain** lions?"

HIERARCHICAL CLASSIFICATION: A SOPHISTICATED SKILL?

Periodic Table of the Elements

➤ Underpins some of our more abstract and complex repertoires - e.g., scientific and mathematical thinking.

➤ The skill itself has been found to strengthen across development (Kirsten & Stewart, 2022; Mulhern, Stewart & McElwee, 2017) - potentially through natural environmental contingencies.

➤ Positively correlated with measures of intelligence (Kirsten & Stewart, 2022; Mulhern et al., 2017) and language (Mulhern et al., 2017).

➤ Is it possible to teach these repertoires? A question posed by our 2018 paper (Mulhern, Stewart & McElwee, 2018).

TEACHING ARBITRARY CONTAINMENT

➤ Participants:

  ➤ Three typically developing 5-year-olds (Mean age = 5 years 3.7 months) - Experimental Group.

  ➤ Three typically developing 5-year-olds (Mean age = 5 years 4.7 months) - Control Group.

➤ Experimental Design - Combined multiple baseline design - across participants and across relational components.

ASSESSMENT AT INTAKE

➤ All participants were first assessed for non-arbitrary containment repertoires ,and then arbitrary containment repertoires to determine their eligibility for inclusion.

➤ All participants were also assessed for language ability (Peabody Picture Vocabulary Test, 4th Edition - PPVT4; Dunn & Dunn, 2007), categorisation ability (Children's Category Test - CCT; Boll, 1993) and class inclusion.

➤ This assessment was conducted both prior to training and. Six months following the cessation of training.
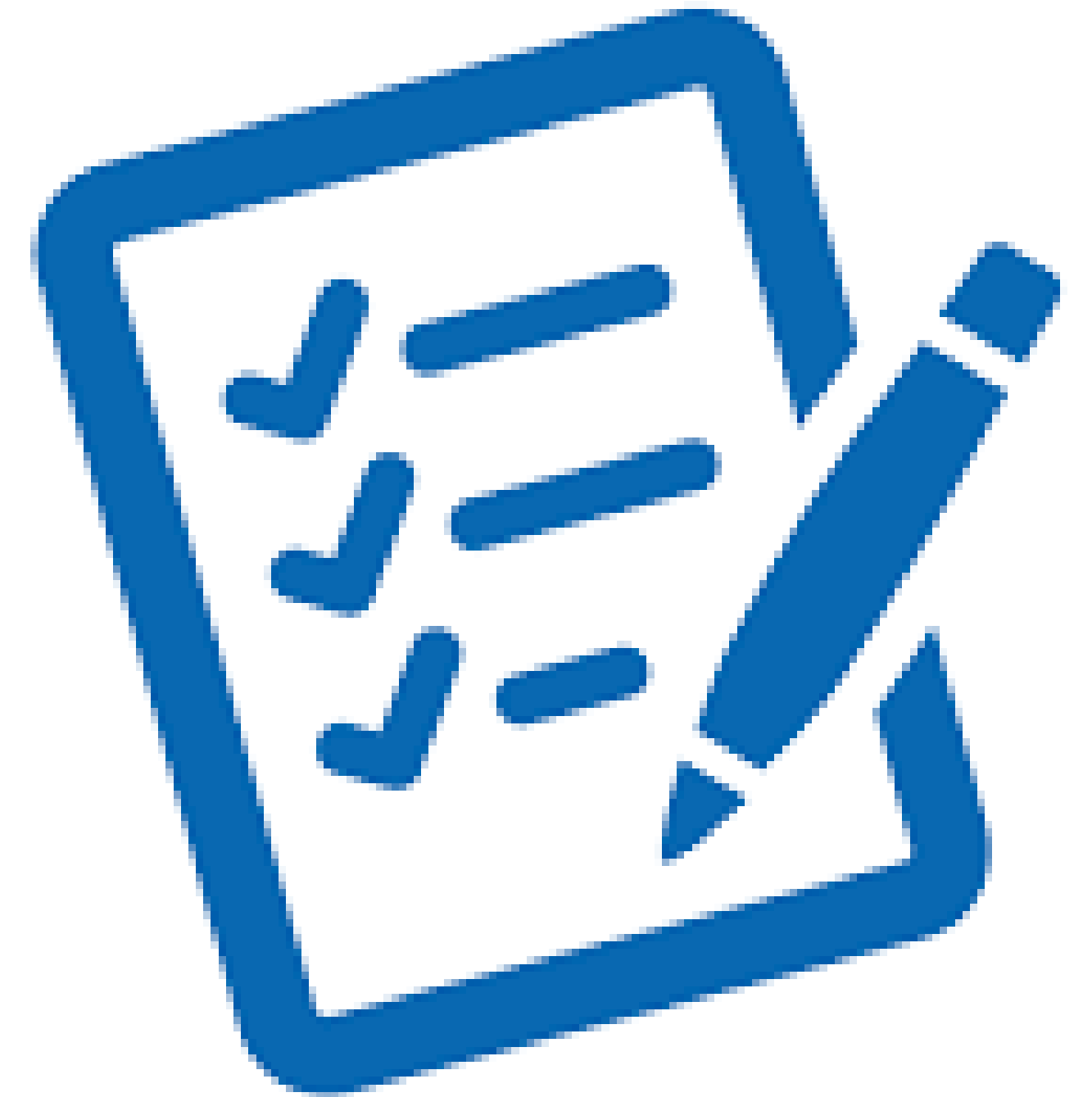
CORRECT ARBITRARY CONTAINMENT RESPONSES AT INTAKE

Participant	ME	ToF ME	CE	ToF CE	Total
EP1	68.75%	62.5%	50%	43.75%	56.25%
EP2	62.5%	62.5%	50%	43.75%	54.69%
EP3	56.25%	50%	50%	43.75%	50%
CP1	75%	56.25%	50%	50%	59.38%
CP2	62.5%	56.25%	50%	50%	57.81%
CP3	62.5%	56.25%	43.75%	37.5%	50%

A grap is INSIDE a blorg.
A Blorg is Red.
A Grap is Blue

Does a blorg contain something blue?

➤ The relationship between nonsense syllables were presented as text on a laptop with up to 4 stimulus sets.

   ➤ E.g., "A blog is inside a trap."

➤ Underneath this description is a question which assesses ME, CE or ToF.

   ➤ E.g., "Is a blog inside a grap?"

➤ A total of 64 questions.

BASELINE ASSESSMENT

➤ Each participant was assessed across four stimulus sets for arbitrary containment relational responding across:

    ➤ Mutually entailed relations (16 questions),

    ➤ Combinatorially entailed relations (16 questions), and

    ➤ Transformation of stimulus function (32 questions).

➤ No feedback or positive reinforcement was provided.

➤ Participants were introduced to training if:

    ➤ Baseline responding was table, and/or

    ➤ The previous participant had completed that phase of training.
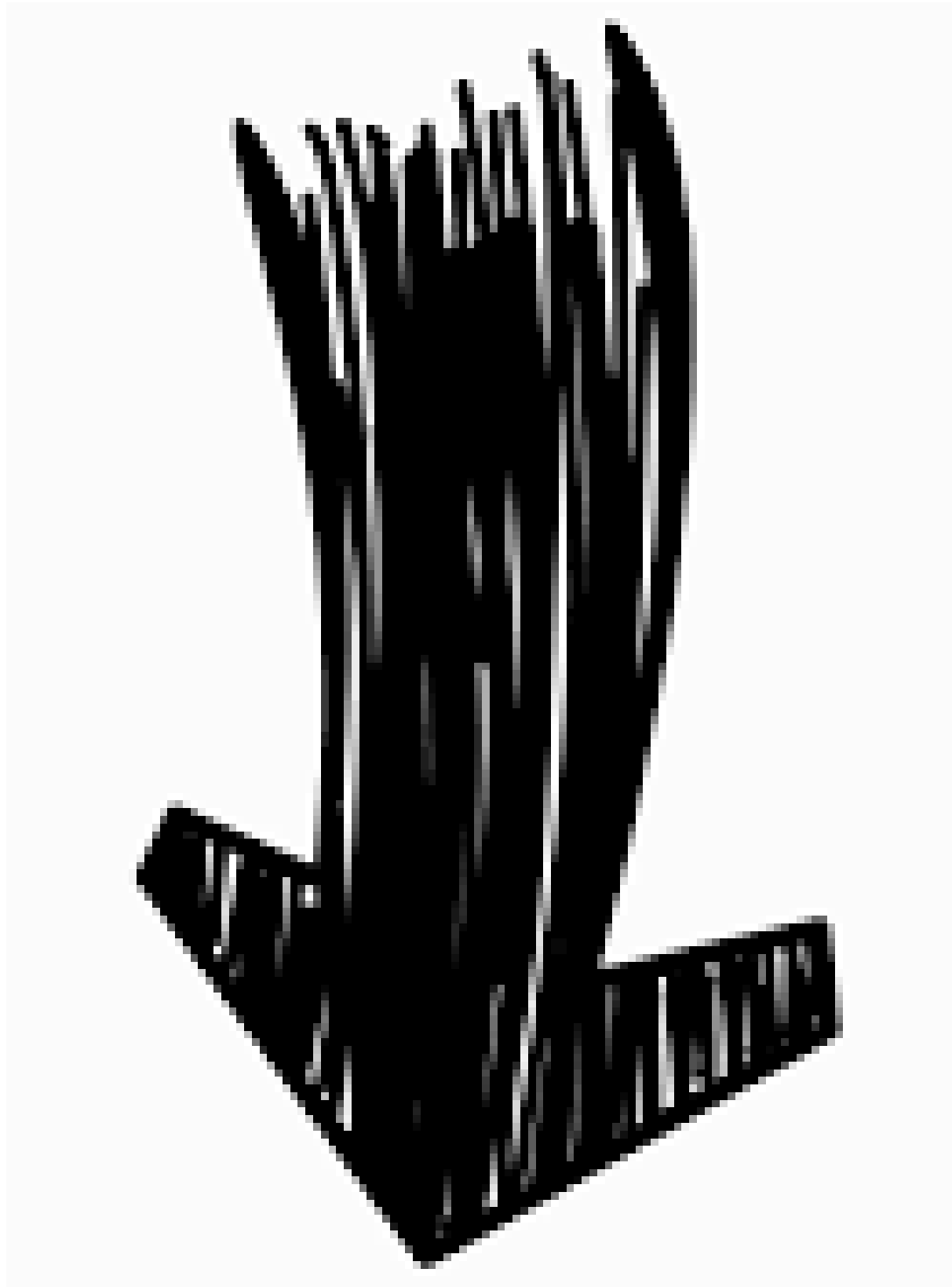
➤ Phase 1 - Mutually entailed relations (2 stimuli).

➤ Phase 2 - Transformation of stimulus functions of mutually entailed relations (2 stimuli).

➤ Phase 3 - Combinatorially entailed relations (3 stimuli).

➤ Phase 4 - Transformation of stimulus functions of combinatorially entailed relations (3 stimuli).

CONSEQUENCES

➤ Positive reinforcement (tokens and praise for correct responses in addition to specific feedback.

➤ FR4 exchange of tokens for stickers.

➤ Participant was given feedback for incorrect responses and re-exposed to the trial.

➤ If the participant beat their score from the previous session, they could then choose something from the stationery boxy.

➤ The participant was exposed to training using one stimulus set.

➤ Once mastery criterion was met (i.e., 100%), the participant was then assessed for generalisation.

➤ If the participant demonstrated generalisation, they progressed onto the next phase of training, if not, they were re-exposed to training using a novel stimulus set.

➤ Then the next participant was introduced to that phase of training (dependent on a stable baseline).
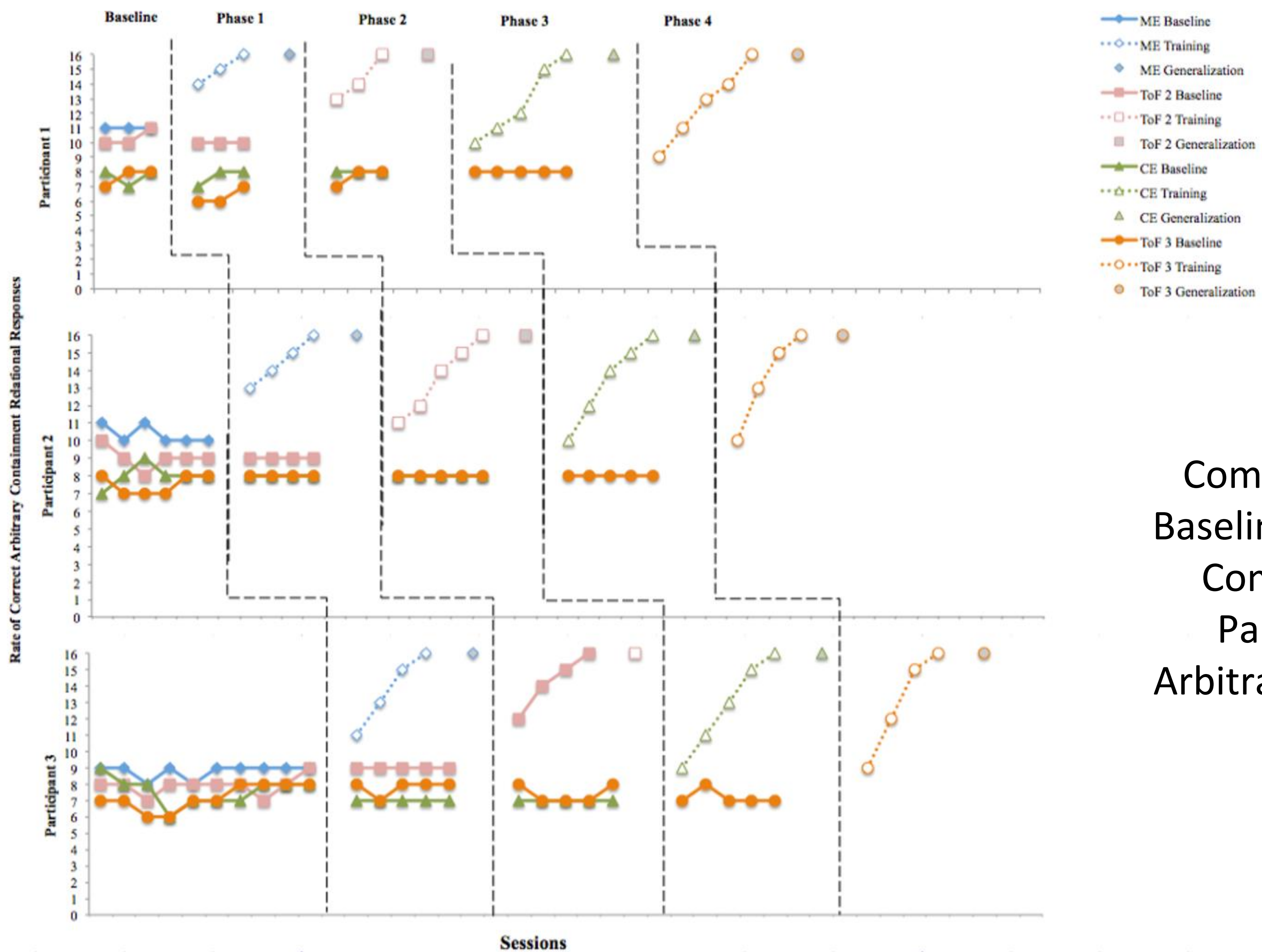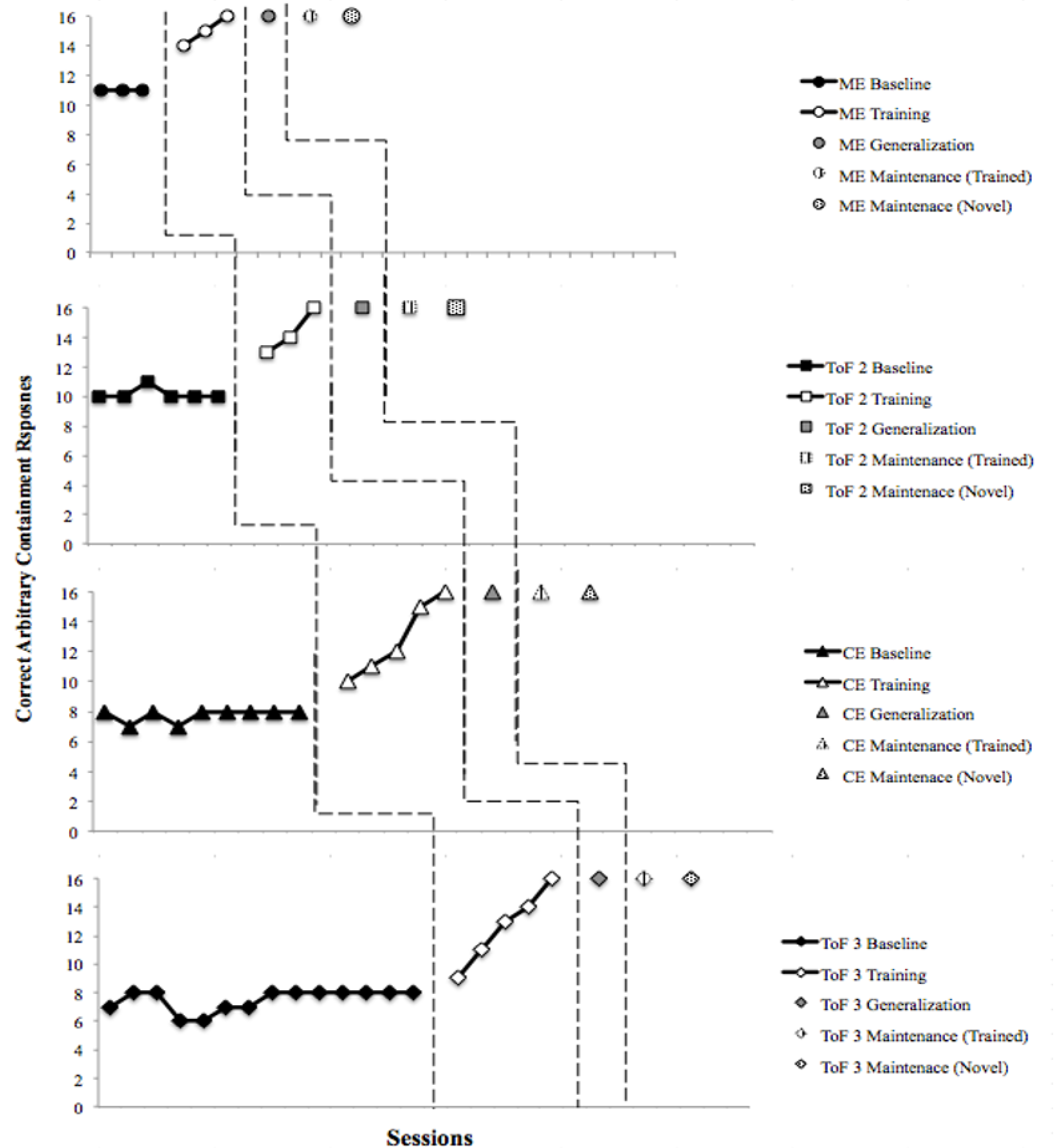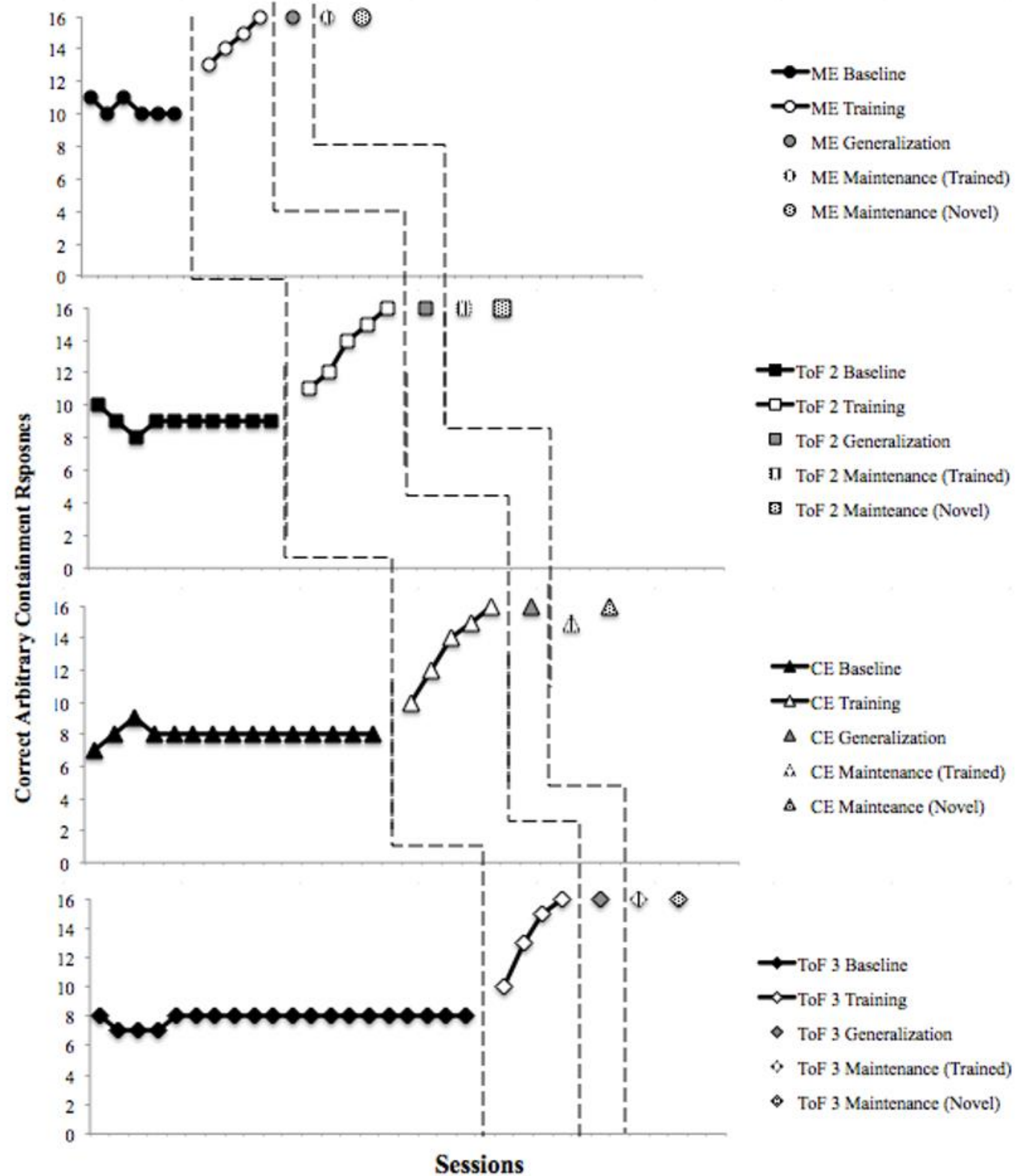
Combined Multiple Baseline Design Across Components and Participants for Arbitrary Containment

Multiple Baseline Across Relational Components Design for Participant 1
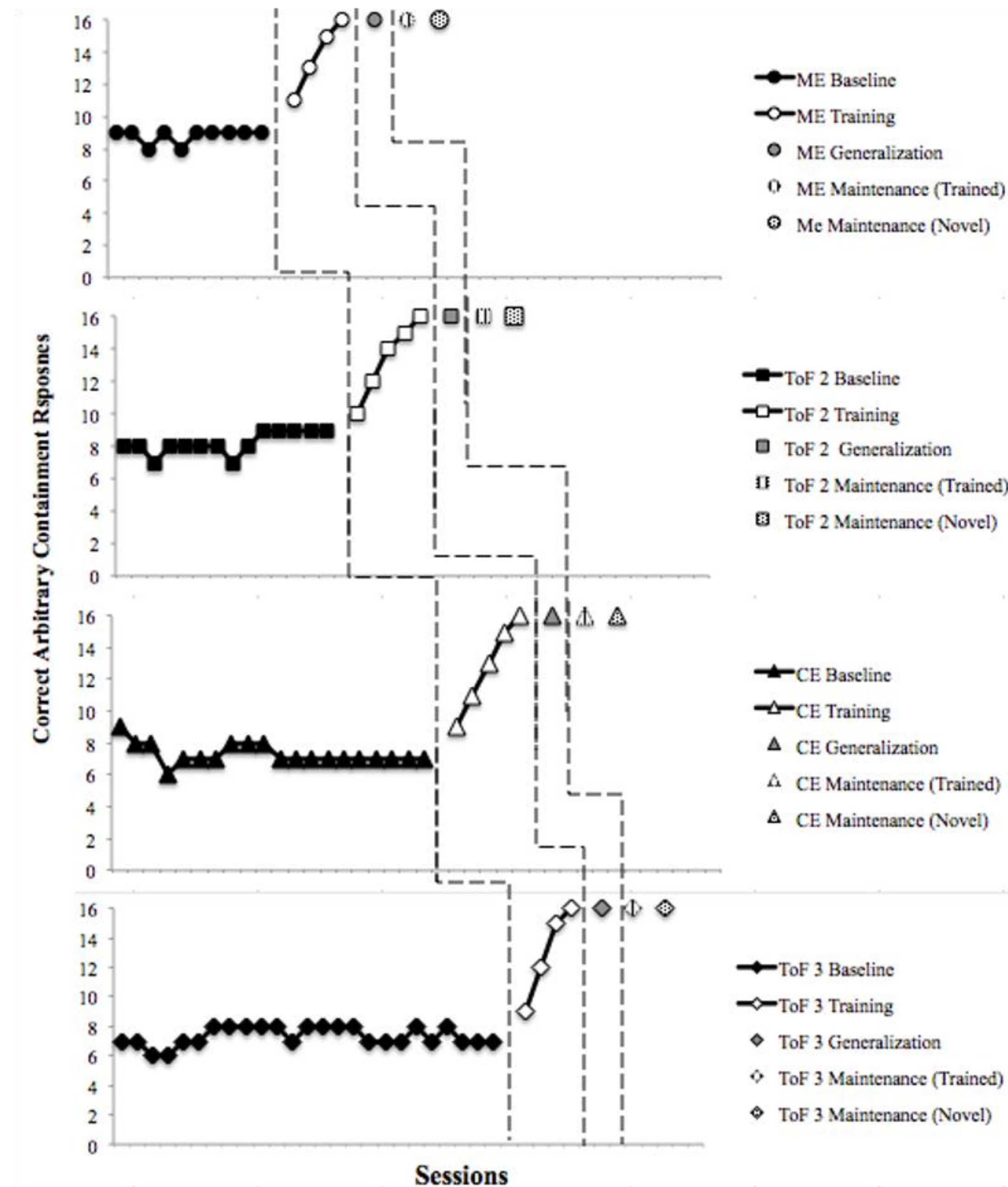
Includes 5 week Maintenance Data

Multiple Baseline Across Relational Components Design for Participant 2

Includes 5 week Maintenance Data

Multiple Baseline Across Relational Components Design for Participant 3

Includes 5 week Maintenance Data

➤ Training sessions were conducted over a five-week period.

➤ All participants generalised arbitrary containment responding to novel stimuli across all phases.

➤ Maintenance was also demonstrated for all three participants 5 weeks post-training, and again at six months following the cessation of training.

➤ Both groups were rested on CCT, PPVT4 and class inclusion six months following the cessation of training.

PPVT4, CCT AND CLASS INCLUSION SCORES

Participant	PPVT4 Raw Score			CCT Raw Score			Class Inclusion Score		
	Time 1	Time 2	Score Change	Time 1	Time 2	Score change	Time 1	Time 2	Score Change
EP1	87	95	^ 8	66	69	^ 3	4	5	^ 1
EP2	84	90	^ 6	62	64	^ 2	4	5	^ 1
EP3	81	89	^ 8	60	64	^ 4	3	5	^ 2
CP1	88	90	^ 2	66	67	^ 1	5	5	0
CP2	89	92	^ 3	67	67	0	5	5	0
CP3	85	87	^2	66	67	^ 1	3	4	^ 1

➤ Although the experimental group demonstrated gains in all areas, neither group showed improvements in relation to standardised scores or percentiles - and were therefore, clinical non-significant.

TEACHING ARBITRARY HIERARCHY

➤ Participants:

   ➤ Three typically developing 6-year-olds (Mean Age = 6 years 4.3 months) - Experimental Group.

   ➤ Three typically developing 6-year-olds (Mean Age = 6 years 3.3 months) - Control Group.

➤ Experimental Design - Combined multiple baseline design - across participants and across relational components.

➤ All participants were first assessed for arbitrary hierarchical repertoires to determine their eligibility for inclusion - those with a total score of 60% or less were included.

➤ All participants were also assessed for language ability (Peabody Picture Vocabulary Test, 4th Edition - PPVT4; Dunn & Dunn, 2007), categorisation ability (Children's Category Test - CCT; Boll, 1993) and class inclusion.

➤ This assessment was conducted both prior to training and. Six months following the cessation of training.

CORRECT ARBITRARY HIERARCHY RESPONSES AT INTAKE

| Participant	ME	ToF ME	CE	ToF CE	Total
EP1	62.5%	56.25%	50%	43.75%	53.13%
EP2	56.25%	43.75%	43.75%	43.75%	46.88%
EP3	50%	43.75%	43.75%	37.5%	43.75%
CP1	68.75%	56.25%	50%	43.75%	54.69%
CP2	56.25%	50%	50%	50%	48.44%
CP3	43.75%	43.75%	43.75%	37.5%	42.19%

METHOD AND TRAINING SEQUENCE

➤ Identical to the previous study, however, hierarchy relations were described.

➤ Baseline, training sequence, consequences and progressions were identical to the arbitrary containment training study.

A Zimp is a type of Yalt.

Is a Yalt a type of Zimp?

Combined Multiple Baseline Design Across Components and Participants for Arbitrary Hierarchy
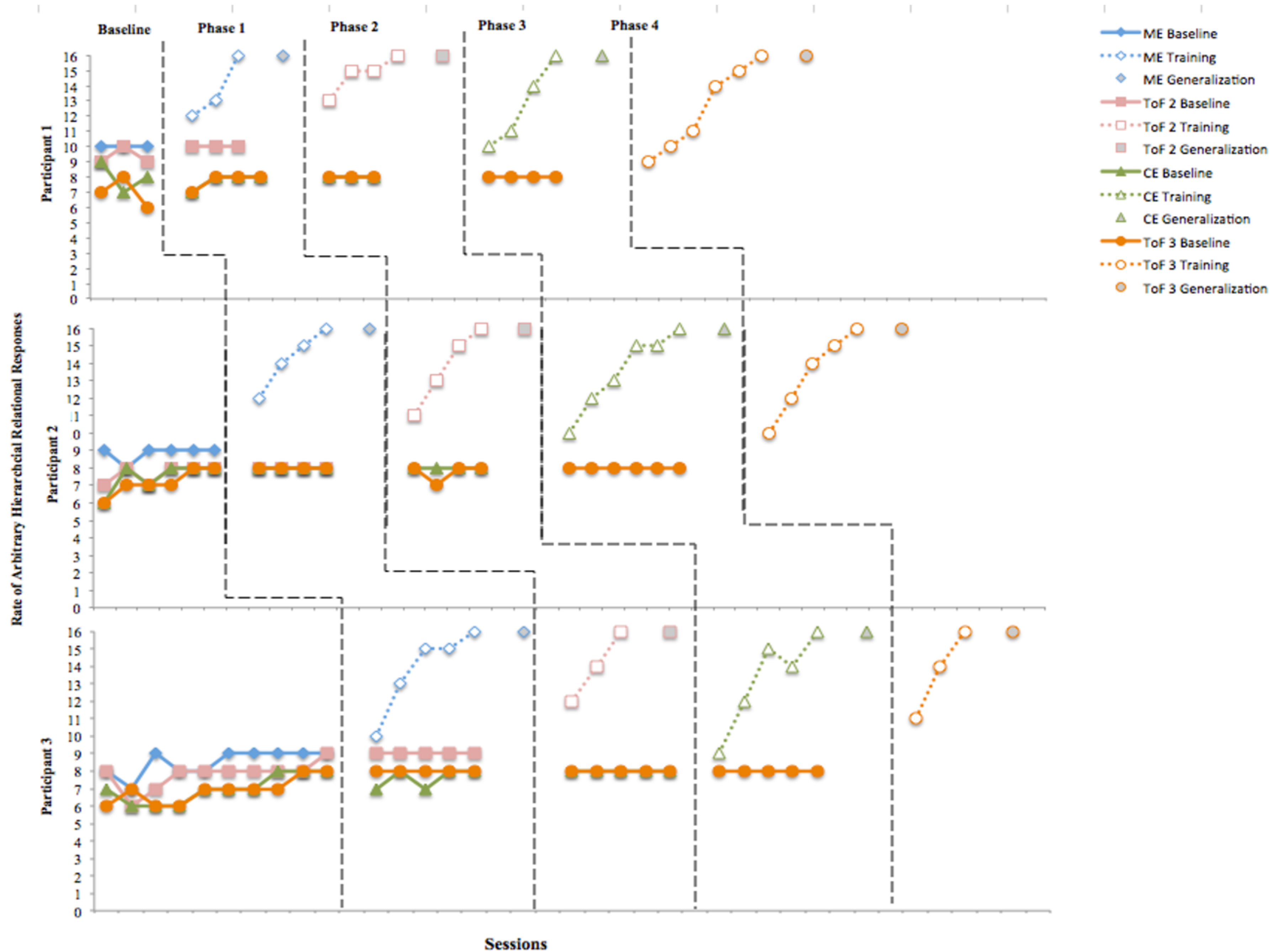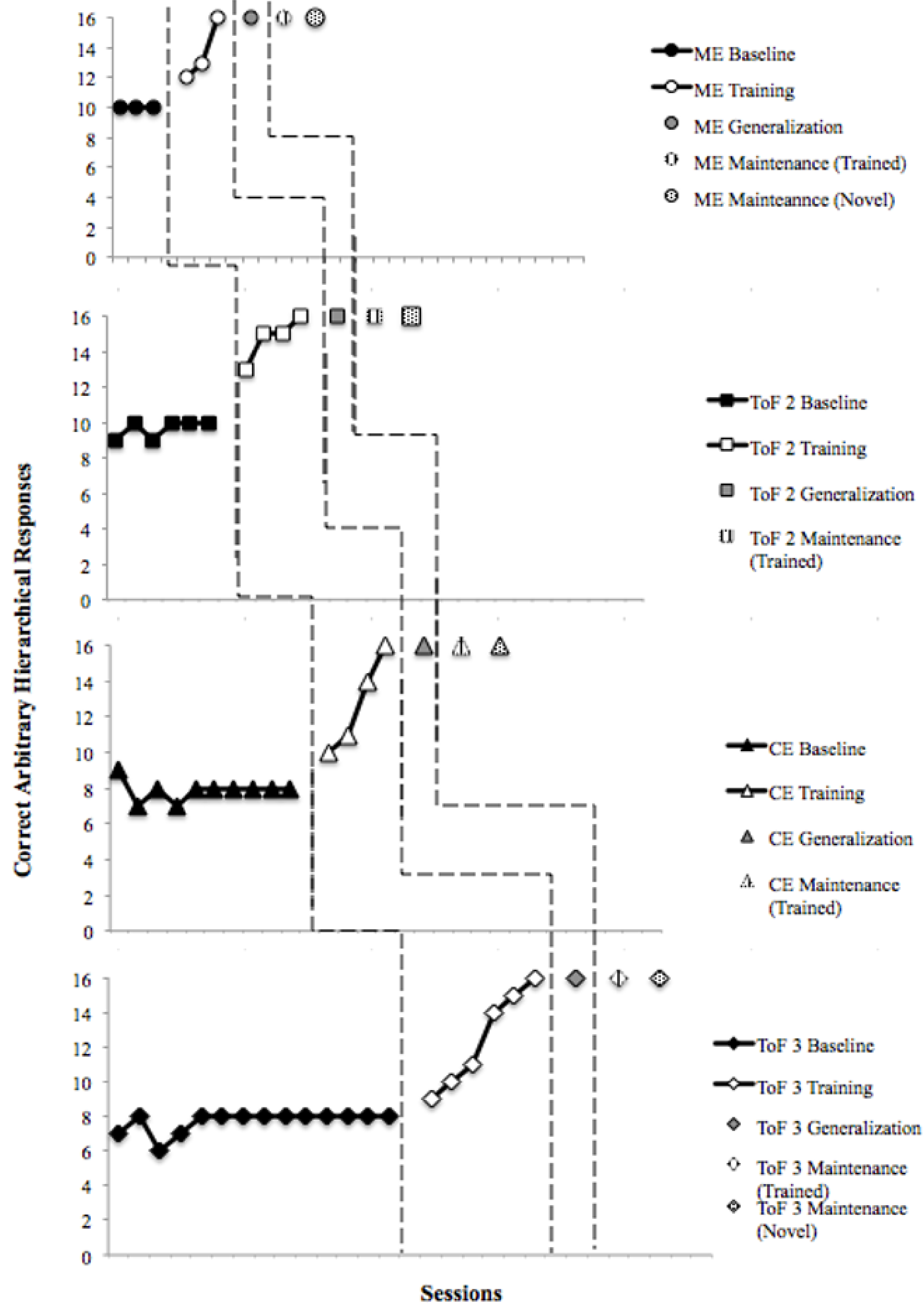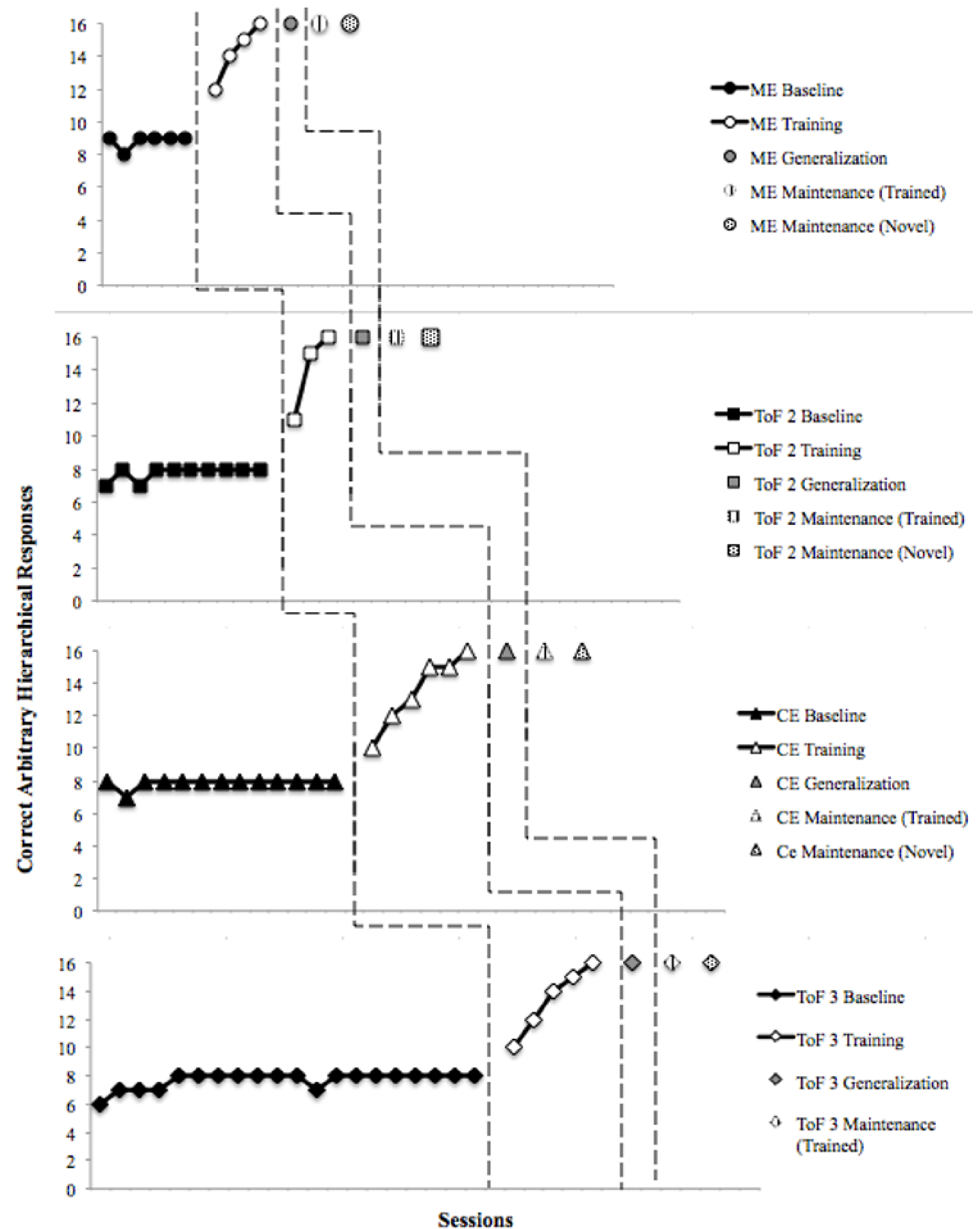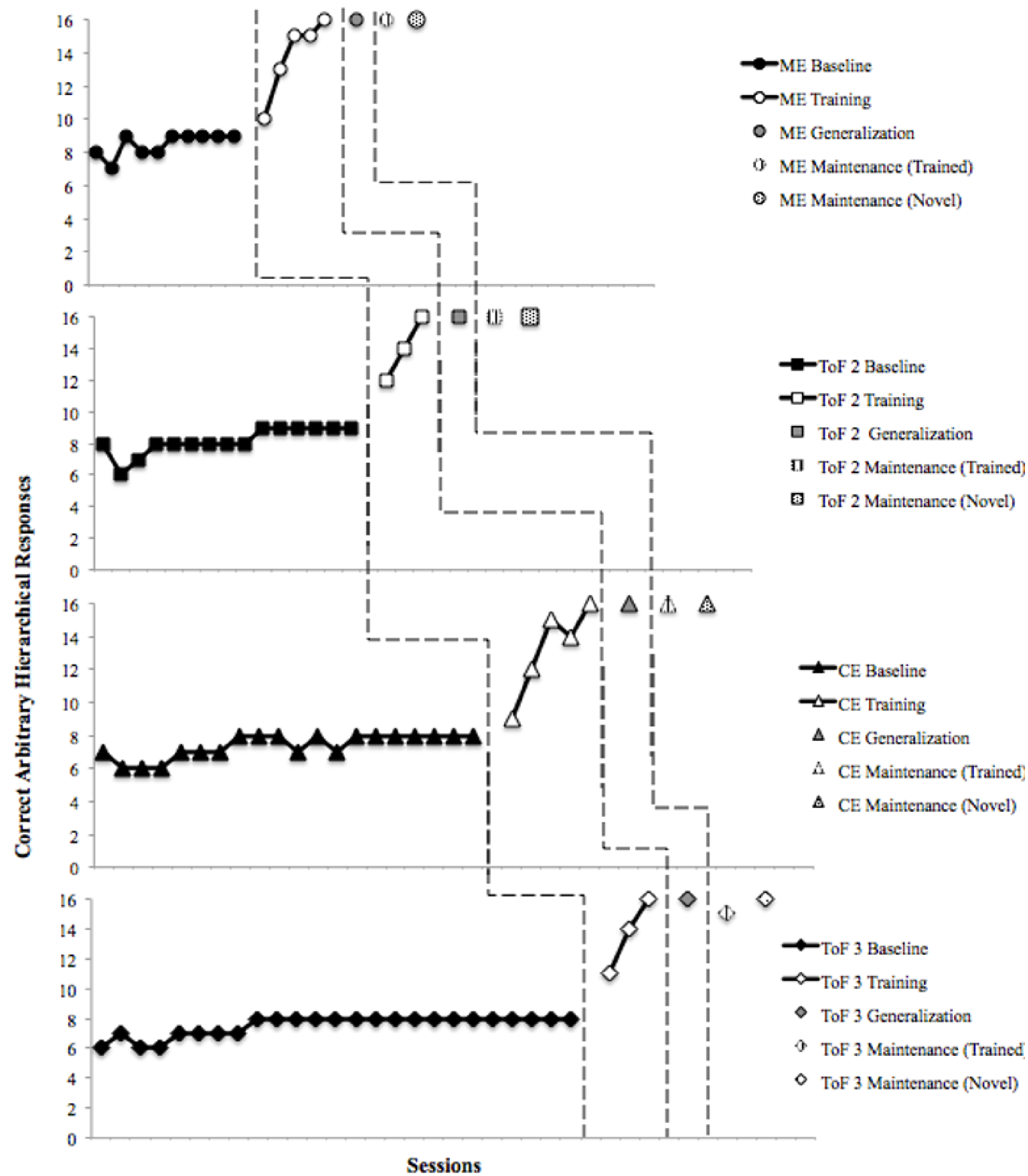
Multiple Baseline Across Relational Components Design for Participant 1 (Arbitrary Hierarchy)

Includes 5 week Maintenance Data

Multiple Baseline Across Relational Components Design for Participant 2 (Arbitrary Hierarchy)

Includes 5 week Maintenance Data

Multiple Baseline Across Relational Components Design for Participant 3 (Arbitrary Hierarchy)

Includes 5 week Maintenance Data

➤ Training sessions were conducted over a six-week period.

➤ All participants generalised arbitrary hierarchical responding to novel stimuli across all phases.

➤ Maintenance was also demonstrated for all three participants 5 weeks post-training and again at six months post-training.

➤ Both experimental and control groups were re-tested on CCT, PPVT4 and class inclusion responding at six months following training.

PPVT4, CCT AND CLASS INCLUSION SCORES

Participant	PPVT4 Raw Score			CCT Raw Score			Class Inclusion Score		
	Time 1	Time 2	Score Change	Time 1	Time 2	Score change	Time 1	Time 2	Score Change
EP1	108	116	^ 8	66	69	^ 3	6	7	^ 1
EP2	107	114	^ 7	69	71	^ 2	5	7	^ 2
EP3	100	107	^ 7	62	65	^ 3	5	6	^ 1
CP1	104	106	^ 2	67	68	^ 1	5	6	^ 1
CP2	104	105	^ 1	62	63	^ 1	5	5	0
CP3	98	100	^ 2	64	64	0	5	5	0

➤ Although the experimental group demonstrated gains in all areas, neither group showed improvements in relation to standardised scores or percentiles - and were therefore, clinical non-significant.

CONCLUSION FOR BOTH STUDIES

➤ These were the first studies to successfully train arbitrary containment and arbitrary hierarchy repertoires in young children - while also demonstrating generalisation and maintenance of gains.

➤ Signposted directions for future research -

  ➤ Training with new population pools.

  ➤ Further consider the impact of training on additional outcome measures (e.g., verbal ability, cognitive ability),

  ➤ Potential standardised curriculum?

Teresa Mulhern

Relational Frame Theory

Made Simple

Springer
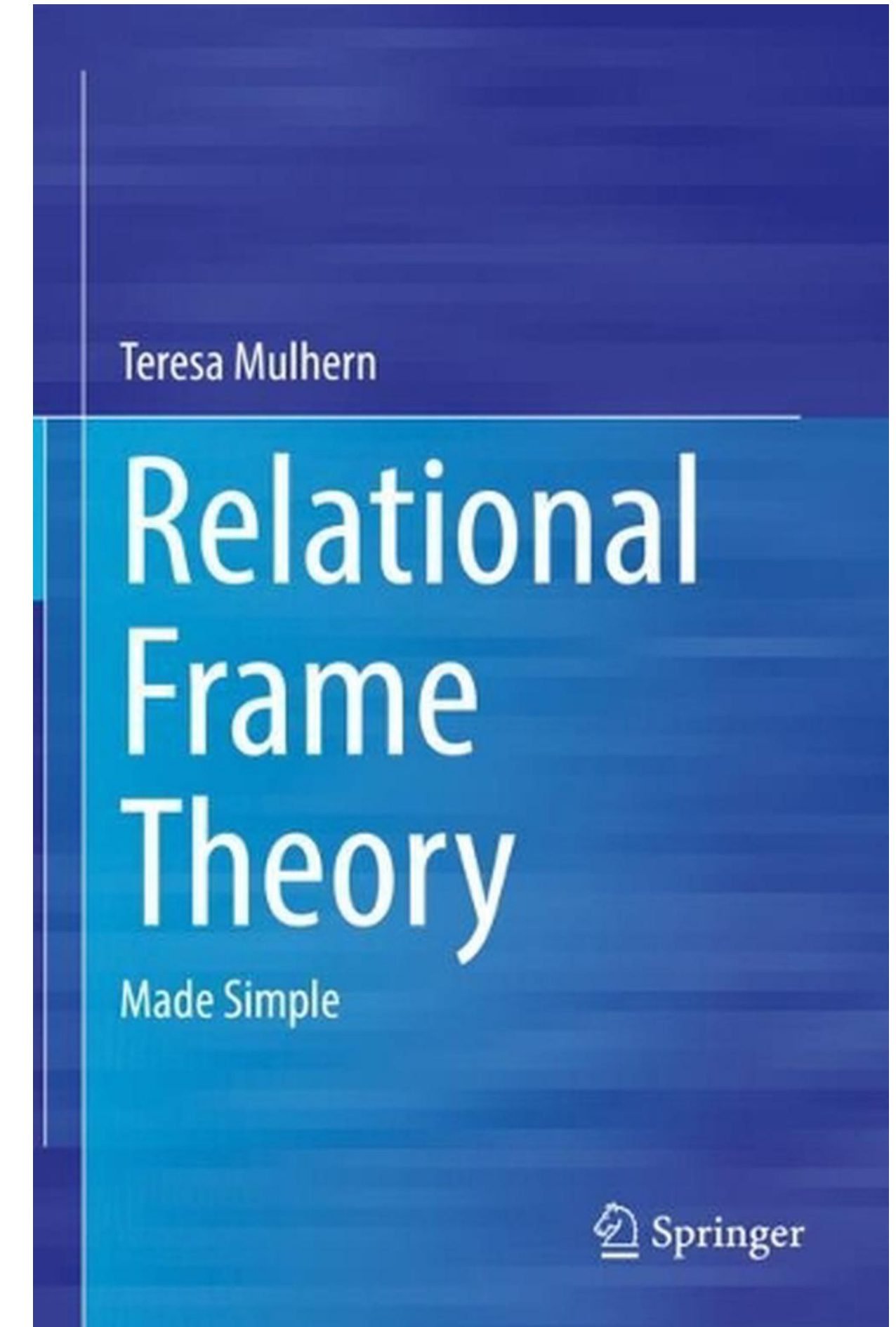
OUR GENERAL DISCUSSION - OVER TO YOU!

➤ How does this fit with what you know already?

➤ What are some implications for your research and practice?

➤ What would you like to see next in this area of research?

➤ Any questions or comments?