The Effects of teleMCT+DG on People with Severe Nonfluent Aphasia

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Introduction

Nonfluent aphasia is characterized by notable impairment in spoken language production, which often causes communication breakdown. Multimodality communication (e.g., gestures) can increase functional communication success.

Multimodal Communication Treatment (MCT)
- Teaches various communication modalities to improve communication breakdown resolution (Purdy & VanDyke, 2011)
- MCT addresses single word confrontation naming difficulty by training participants to draw, gesture, access a communication book, write, and/or speak.

Limitations of previous MCT
- No treatment at the discourse level & limited generalization to daily conversations (Purdy & VanDyke, 2011; Purdy & Wallace, 2015; Wallace & Kayode, 2016)
- Only in-person service delivery limited who can participate.

MCT with discourse and group therapy via telepractice
- Included a discourse task (generating a story of a picture) and group therapy
- Emphasized ecological validity and generalization to real-life activities

Study Purpose:
To investigate the therapeutic effects of telepractice delivered teleMCT+DG for people with severe nonfluent aphasia.
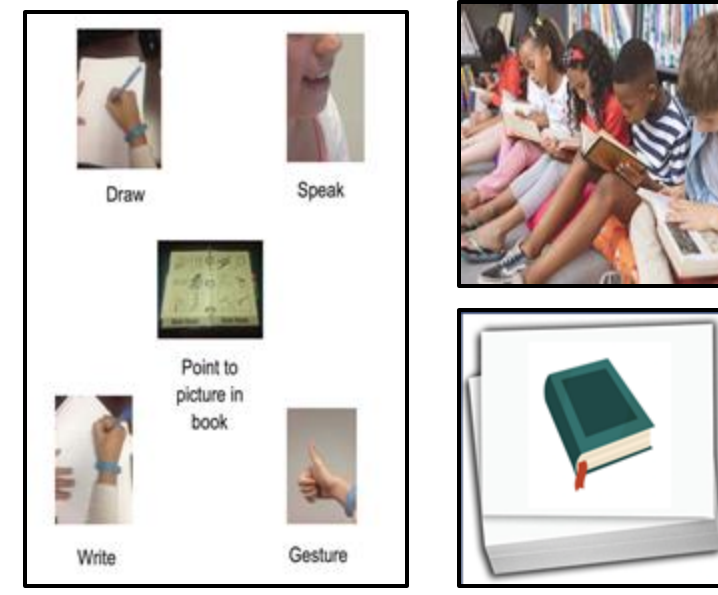
Methods

Participants
- Two participants with chronic nonfluent aphasia

	P1	P2
Sex, Age	Male, 50 years	Male, 68 years
Years of Education	16	16
Etiology (Post onset)	CVA	CVA
WAB-R AQ & WAB-R Classification	32.3/100 Broca's type	12.4/100 Global type
Pyramid and Palm Tree	47/52	30/52
CLQT+ Composite Severity	2/4	Unable to complete

Materials
- 20 trained & 10 untrained items
- Object picture cards (real items, black and white items, and colored graphic images)
- Discourse scene pictures
- Communication book
- Modality Chart

Outcome Measures at word & discourse level tasks
- Initial accuracy rate = #Accurate responses in any modality / #Total items
- Repair accuracy rate = #Accurate responses in any modality / #Repair opportunities
- Initial modality frequency = #Accurate responses in each modality
- Repair modality frequency = #Accurate responses in each modality
- Repair modality all attempts (Secondary) = #All attempted (accurate & inaccurate) responses
- Discourse overall accuracy = # Accurate responses in any modality / #total items

Analysis:
- Single-subject design with multiple baselines
- Cohen's D effect size calculation
- TAU-U calculation (Parker et al., 2010)
  https://singlecaseresearch.org/calculators/tau-u/

Treatment Procedure

Overview
- 3 sessions per week (2 individual & 1 group session)
- 10 weeks of treatment

Individual sessions
- Adopted from Purdy & Wallace (2015)
- Referential Communication Task (RCT): participant requested a picture card from communication partner using one of five modalities
- Modality Production Probes (MPP): training with repetition, evaluating, and retraining of object nouns
- Addition: Story generation: participant created a story based on the image presented to them targeting one of their trained target nouns and practiced modalities to describe the scene. Participant re-read the story that they created at the end.

Group sessions
- Consisted of single-word and discourse tasks
- Single-word task encouraged participants to switch modalities to communicate trained words.
- Participants pre-selected a picture scene to present to the group for the discourse task.

Results

Word Level (RCT)
- Increased initial accuracy rate in P2
- Evidence of improvement in non-spoken modality for both P1 and P2

P01

P02

Table 2. Accuracy and Modality Data in RCT in P1 and P2

Pt	Task	Measure		Items	Cohen's d	TAU	Z	P value
P1	RCT	Accuracy Rate	Initial	Trained	2.729	.625	1.443	.149
				Untrained	2.493	.688	1.588	.112
			Repair	Trained	2.168	.750	1.732	.083
				Untrained	2.965	.750	1.732	.083
		Modality Frequency	Initial Spoken	Trained	3.660	.750	1.732	.083
				Untrained	1.531	.500	1.155	.248
			Initial Non-spoken	Trained	6.859	.688	1.588	.112
				Untrained	6.134	.750	1.732	.083
			Repair Spoken	Trained	.000	.063	.144	.885
				Untrained	-.500	-.428	-1.010	.312
			Repair Non-spoken	Trained	.934	.313	.722	.471
				Untrained	-2.195	-1.000	-2.309	.021
P2	RCT	Accuracy Rate	Initial	Trained	1.240	.688	1.588	.112
				Untrained	1.146	.938	2.165	.030
			Repair	Trained	.150	.313	.722	.471
				Untrained	.100	.250	.577	.564
		Modality Frequency	Initial Spoken	Trained	Unable to calculate	.000	.000	1.000
				Untrained	.000	.000	1.000
			Initial Non-spoken	Trained	1.353	.688	1.588	.112
				Untrained	1.082	.875	2.021	.043
			Repair Spoken	Trained	.000	.000	.000	1.000
				Untrained	.000	.000	.000	1.000
			Repair Non-spoken	Trained	.250	.313	.722	.471
				Untrained	.000	.188	.433	.665

Note: Cohen's d > 4.0 = Small effect, > 7.0 = Medium effect, > 10.1 = Large effect (Beeson & Robey, 2006)

Discourse Level
- Increased accuracy rate in both P1 and P2
- Evidence of improvement in non-spoken modality for both P1 and P2

P1

P2

Table 3. Accuracy and Modality Data in Discourse Task in P1 and P2

Pt	Task	Measure		Items	Cohen's d	TAU	Z	P value
P1	Discourse	Accuracy Rate		Trained	2.198	.875	2.021	.043
				Untrained	2.305	.750	1.732	.083
		Modality Frequency	Spoken	Trained	1.260	.625	1.443	.149
				Untrained	1.000	.375	.855	.387
			Non-spoken	Trained	3.940	1.125	2.598	.009
				Untrained	4.066	.813	1.876	.061
P2	Discourse	Accuracy Rate		Trained	Unable to calculate	1.000	2.309	.021
				Untrained	1.000	2.309	.021
		Modality Frequency	Spoken	Trained	Unable to calculate	.000	.000	1.000
				Untrained	.000	.000	1.000
			Non-spoken	Trained	Unable to calculate	1.000	2.309	.021
				Untrained	1.000	2.309	.021

Note: Cohen's d > 4.0 = Small effect, > 7.0 = Medium effect, > 10.1 = Large effect (Beeson & Robey, 2006)

Discussion

Summary
- Significant effect sizes were not evident for participants across the primary variables of interest
- Visual inspection of discourse tasks suggested:
  - P1 = variable performance with some potential increase in accuracy and nonverbal modality productions
  - P2 = notable increases in accuracy for treatment and untreated words; increases in nonverbal modality production for mostly treated words; no changes in verbal modalities

Clinical Implication & Future Directions
- Both participants demonstrated some potential changes at the discourse level that were not evidenced in the single word tasks, suggesting this modified treatment may be particular useful at changing discourse level communication.
- Clinicians should consider including discourse level treatment asks for discourse level gains in multimodal communication use.
- Future research could examine other types of discourse and outcome measures.
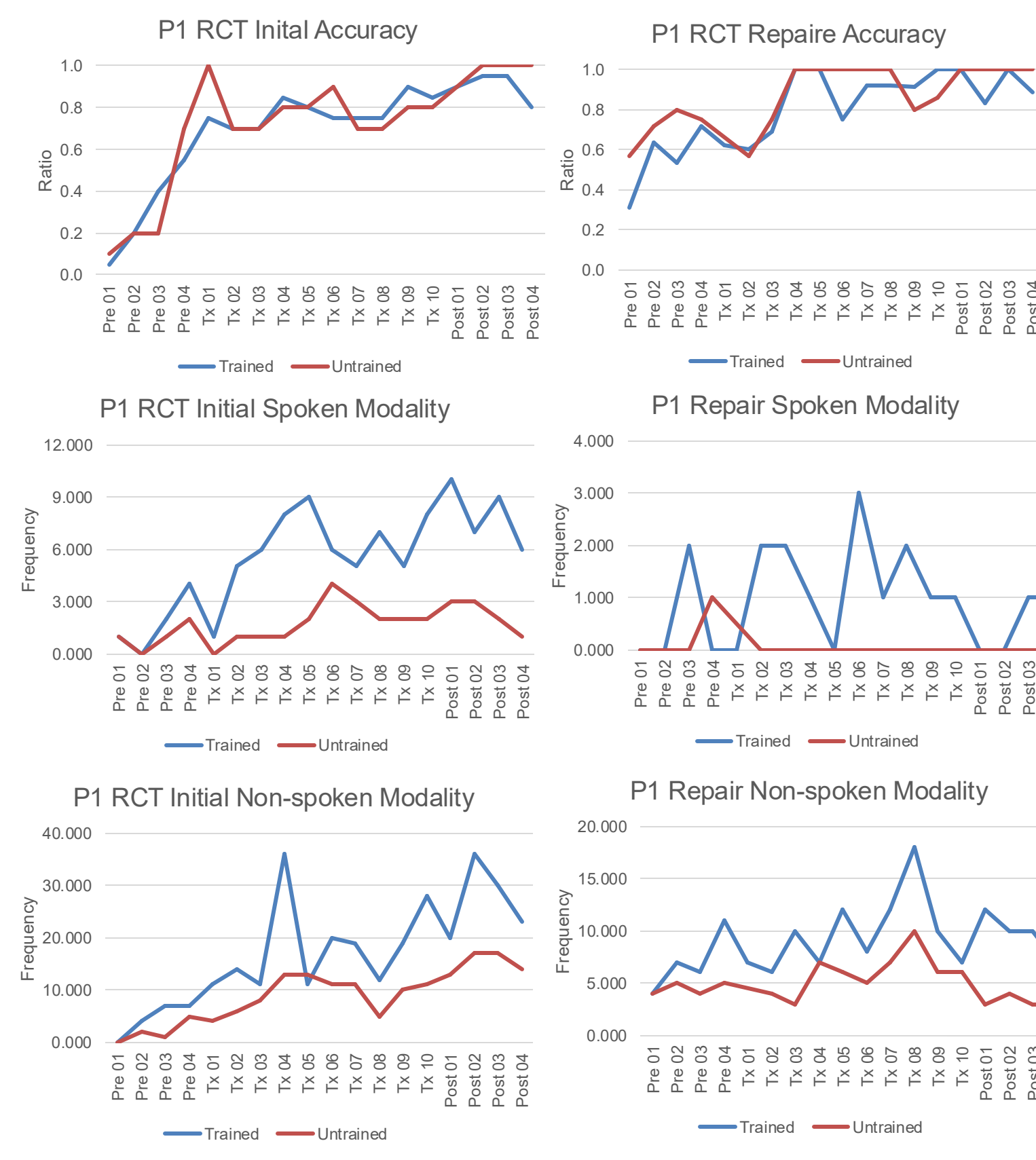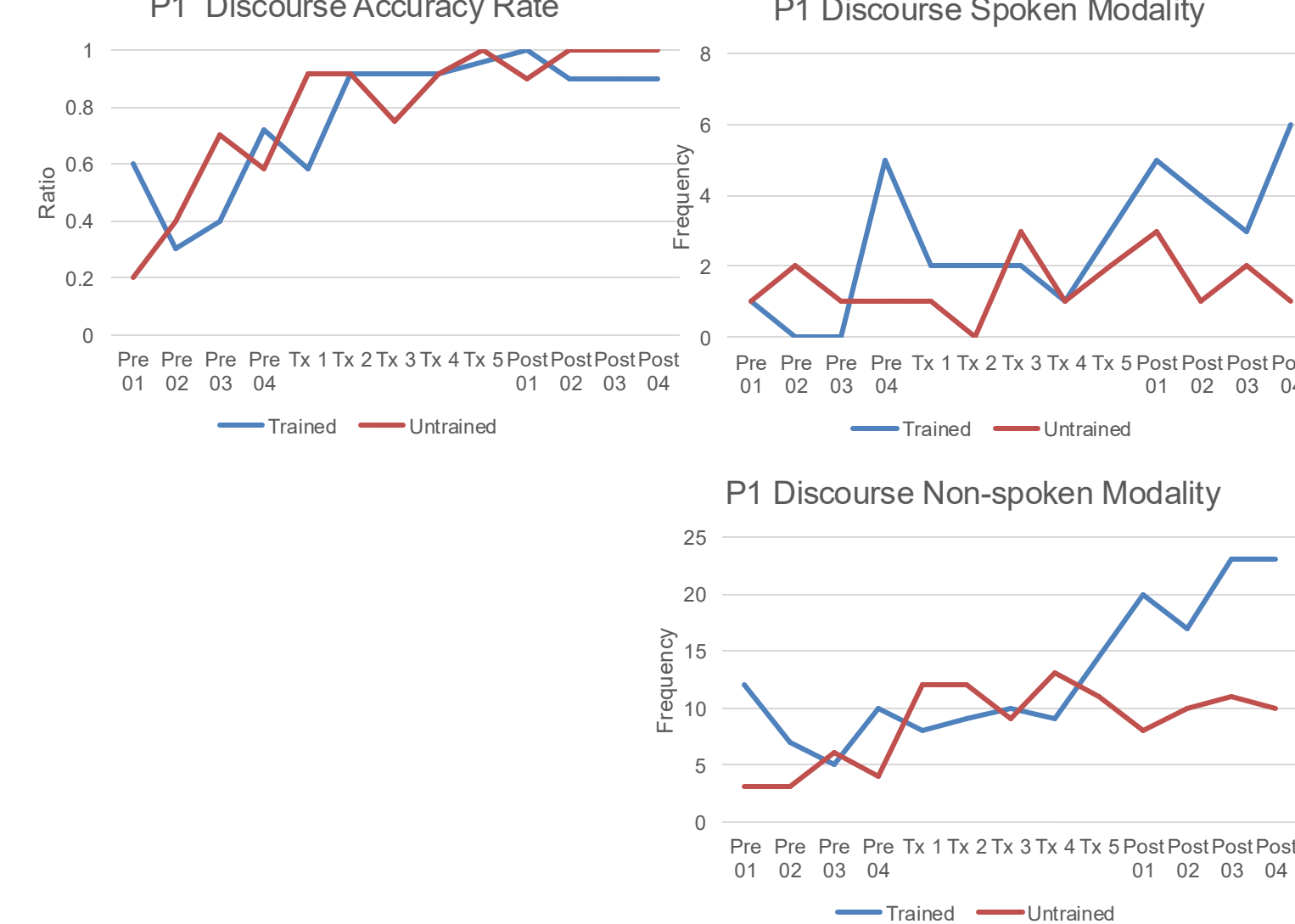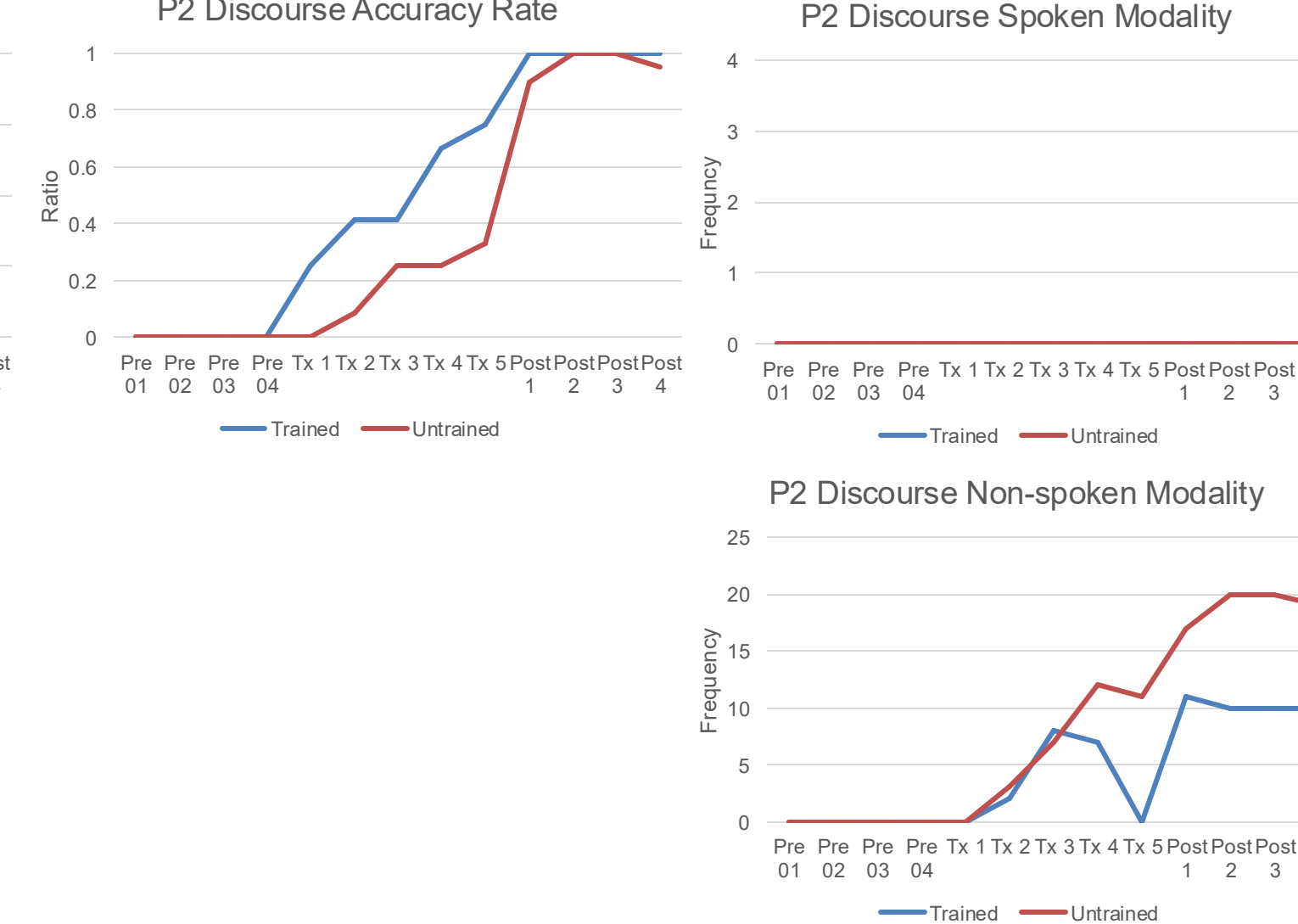
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