The effectiveness of intervention using the SHAPE CODING™ system & the impact of within-session dosage.

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Background:

- Children with DLD have particular difficulties with morphosyntax

SHAPE CODING system

- Teaches grammar explicitly via visual coding

Previous research

Ebbels & van der Lely, 2001, Ebbels 2007, Ebbels et al. (2014, 2007), Kulkarni et al. (2014), Tobin & Ebbels (2019), Calder et al. (2020, 2021a, 2021b)

- Delivered by clinicians (trained in the system)
- Children with severe DLD aged 5-16 years
- 30 mins 1 or 2 x per week for 4-10 weeks
- One language structure per study
- No obvious predictors of who benefits more (Ebbels et al. 2014)
- More intervention = more progress (Calder et al. 2021b)

Aims:

Investigate feasibility of

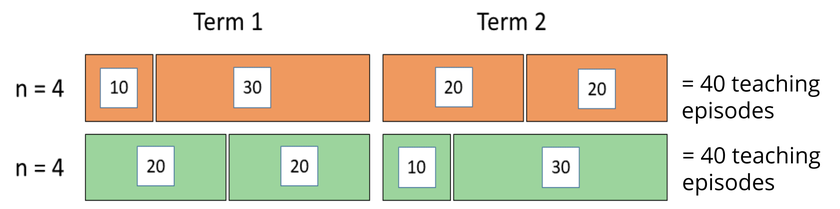
- Individualised target identification & probe tests
  https://shapecoding.com/resources/grammar-spreadsheet
- following intervention steps, techniques & feedback hierarchy
- delivering 40 teaching episodes per 30 min session

Investigate intervention efficacy

- overall & for different children & targets
- delivered with varying numbers of teaching episodes per session

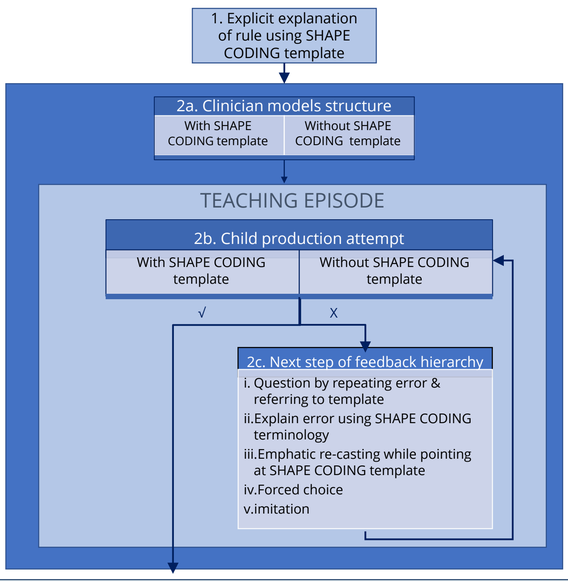
Design:

- 8 participants (8;0-10;10) with DLD
- Intervention 30 mins per wk x 20 wks (10 hrs)
- Individual targets
- Multiple baseline design, each target:
  - >3 baseline tests
  - Weekly probe tests until 90% criterion reached
  - Maintenance tests (2, 6 & 14 weeks after intervention ceased)
- 2 targets per session (split by participant into either 10+30 or 20+20 teaching episodes)



Intervention:

Code: Structure	SHAPE CODING template plus rule	Example
MC9: Subject moves an object to a new place (Subject + Verb + Object + Prepositional Phrase)	Oval moves rectangle to a new place (semi-circle)	You put the pasta in the pot
TA5: sentences requiring the past tense	Adding back arrow for past time onto hexagon blue word adds *-ed* (pronounced /t, d, ld/)	the boy walked
AG1: *are* with plural Noun Phrase	Two red lines in oval needs two blue lines in diamond, *are* in present tense	they are happy
Q15: *Where, why, how* questions	Move the *Wh* shape to the front and then move the diamond to second position	Where is Sam ? / Sam is in the house .
CJ8/9: Coordinated phrases with *but not, or*	Join two shapes the same together with *but not*. The first one happens, the second one doesn't.	the pasta is hot but not soggy

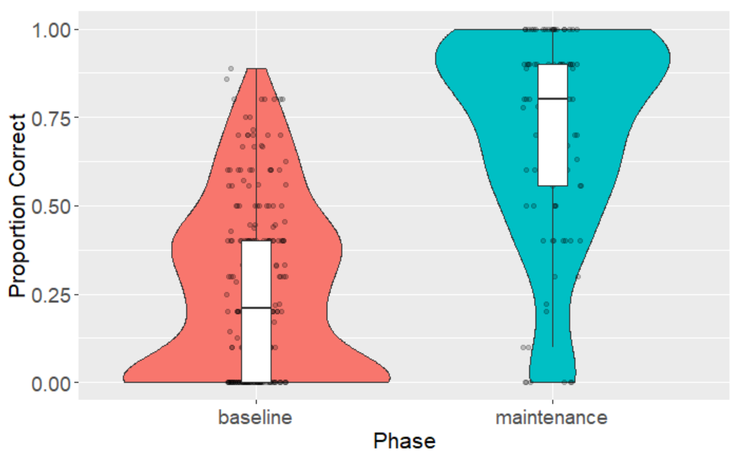


Shape Coding by Susan Ebbels®

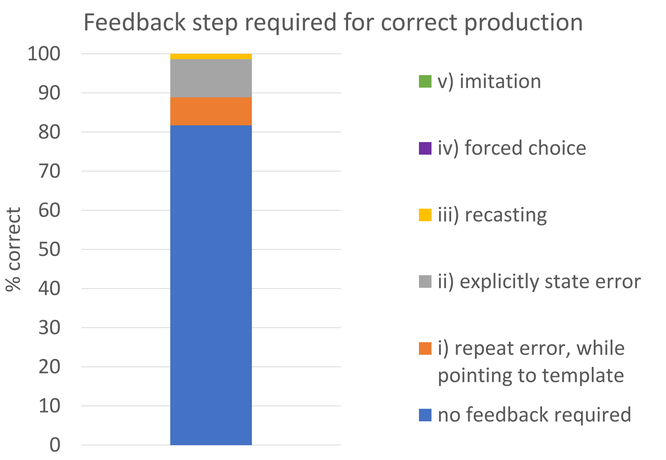
shapecoding.com/intervention-steps/

shapecoding.com/general-techniques/

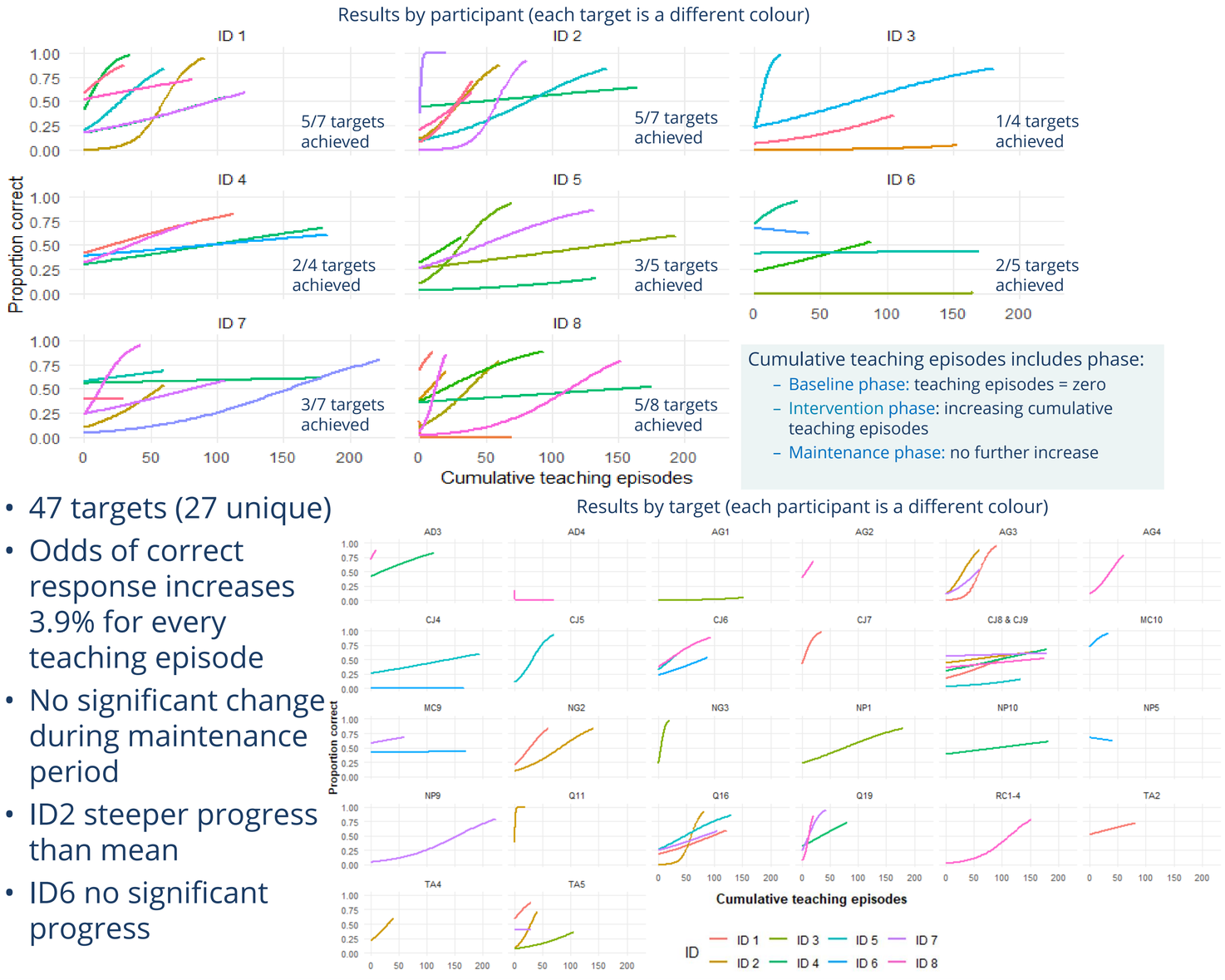
Results:



Maintenance > baseline, $p<.001$, $d=1.6$



Feedback hierarchy hardly needed



Cumulative teaching episodes includes phase:

- Baseline phase: teaching episodes = zero
- Intervention phase: increasing cumulative teaching episodes
- Maintenance phase: no further increase

- 47 targets (27 unique)
- Odds of correct response increases 3.9% for every teaching episode
- No significant change during maintenance period
- ID2 steeper progress than mean
- ID6 no significant progress

	Cumulative intervention sessions			Cumulative teaching episodes		
Predictors	Odds Ratios	Confidence Interval	p-value	Odds Ratios	Confidence Interval	p-value
Mean cumulative count	**1.914**	**1.413 – 2.591**	**<0.001**	**1.039**	**1.017 – 1.061**	**<0.001**
Cumulative count * Teaching episodes per session =10	**0.835**	**0.762 – 0.916**	**<0.001**	1.000	0.993 – 1.006	0.976
Cumulative count * Teaching episodes per session =20	1.017	0.947 – 1.093	0.637	1.000	0.996 – 1.004	0.958
Cumulative count * Teaching episodes per session =30	**1.176**	**1.079 – 1.283**	**<0.001**	1.000	0.995 – 1.006	0. 940

Progress x cumulative teaching episodes unaffected by teaching episodes per session

Achieved targets required 40-60 teaching episodes (2-3 intervention sessions)

Conclusions:

Feasibility

- Target identification & intervention feasible
- Feedback hierarchy rarely needed – errorless learning?

Overall effectiveness

- Scores following intervention higher than baseline
- Significant progress with intervention (cumulative teaching episodes)
- Progress maintained up to 14 weeks

Variation in effectiveness

- Faster progress for one child – most experience
- One child no significant progress – poorest attention
- Rate of progress varied with target
- Cumulative teaching episodes is key (distribution across sessions less important)