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Testing a Learning and Retention Theory Using a Complex Task with 3- to 14-day Retention Intervals

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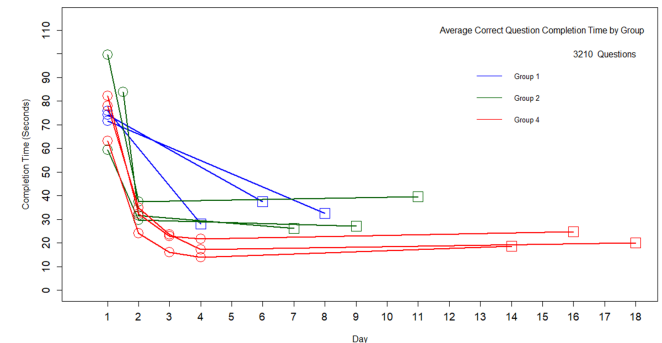
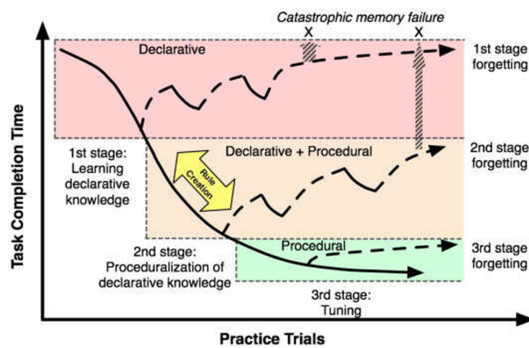
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Outline

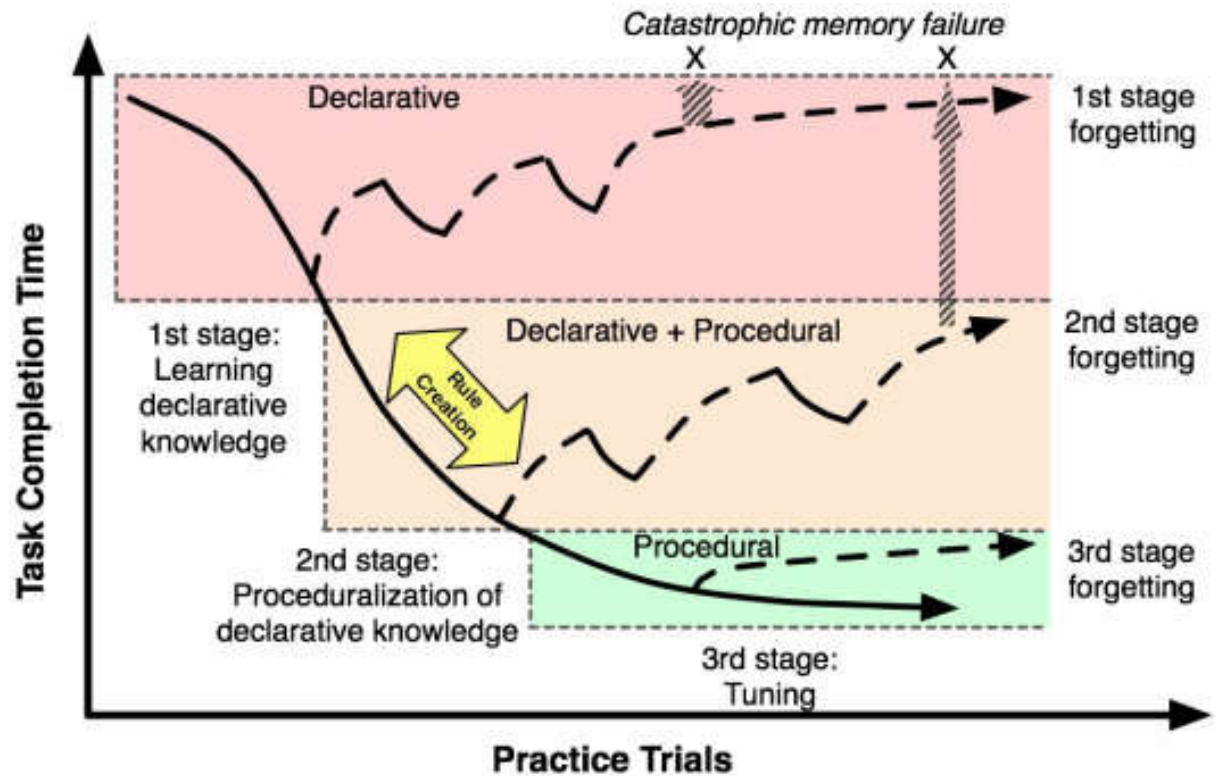
- Background: KRK theory
- Methodology
 - Diagram of procedure (including consent)
 - Mention running online
- Results
 - Dropout rate, # run, # recruited etc.
 - Average # of problems completed, % correct
 - Plot for each group type (1,2,4), one example
 - Figure with all average time completions
 - Individual Differences
- Discussion

Background

KRK Learning Theory

Kim, J. W., Ritter, F. E., & Koubek, R. J. (2013). An integrated theory for improved skill acquisition and retention in the three stages of learning. *Theoretical Issues in Ergonomics Science*, 14(1), 22-37.

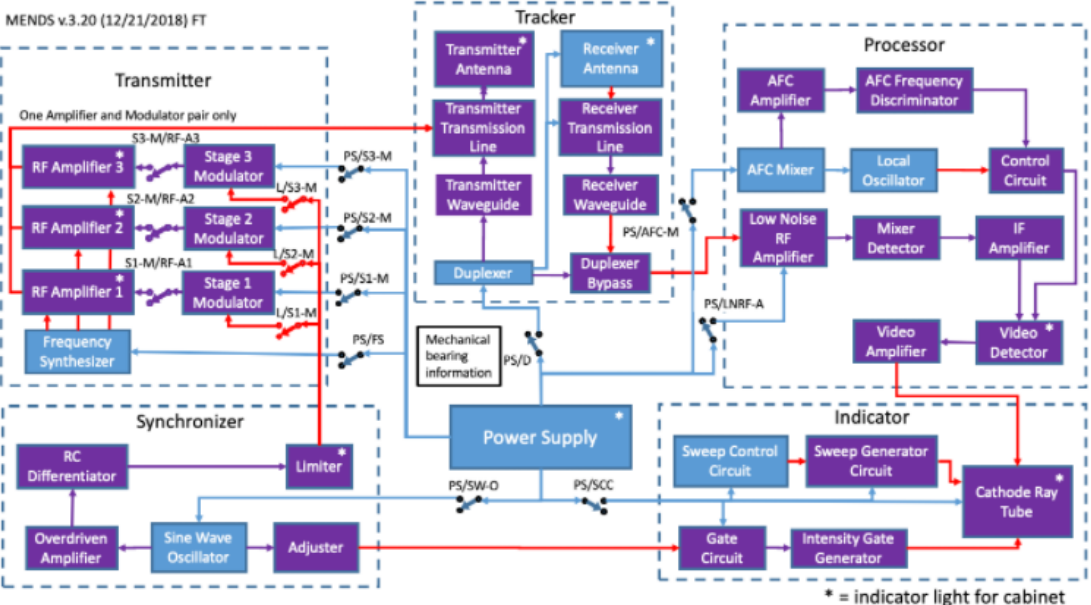
Oury, J. D., Tehranchi, F., & Ritter, F. E. (2018, January). Predicting Learning and Retention of a Complex Task. In *16th International Conference on Cognitive Modeling, ICCM 2018* (pp. 90-95). University of Wisconsin.



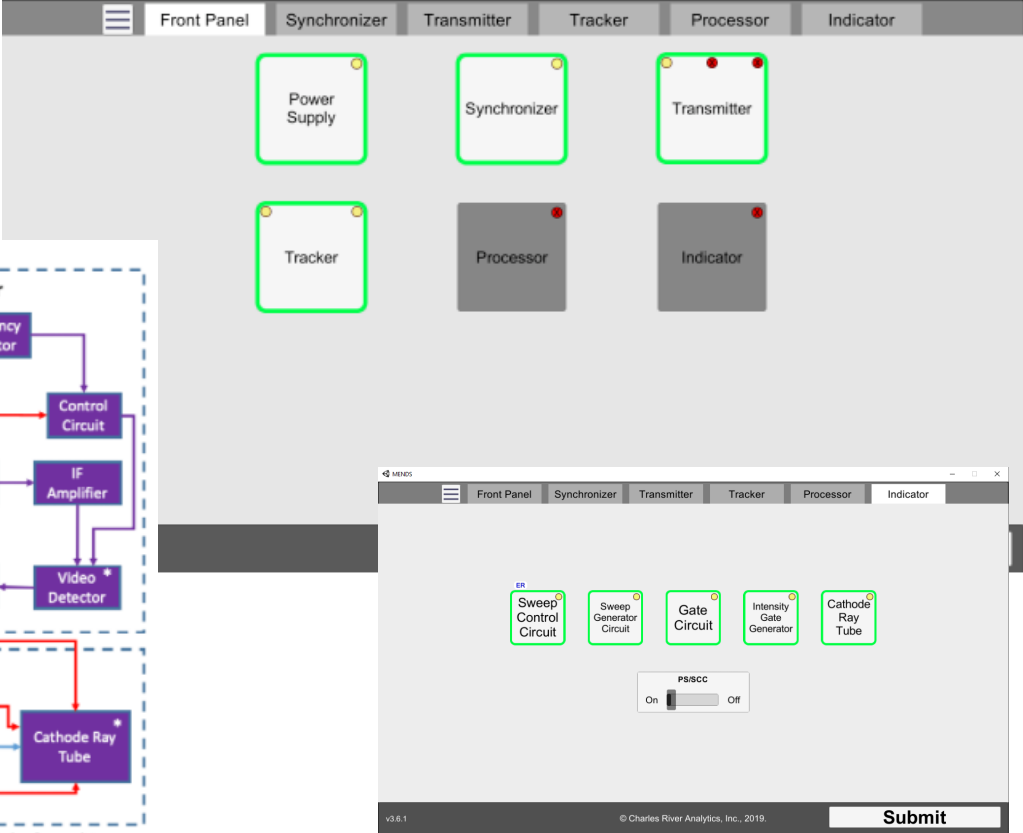
Ben Franklin Radar System – Complex task

Based on the Klingon Laser Bank task
(Bovair, Kieras, Bibby, Ritter)

Schematic

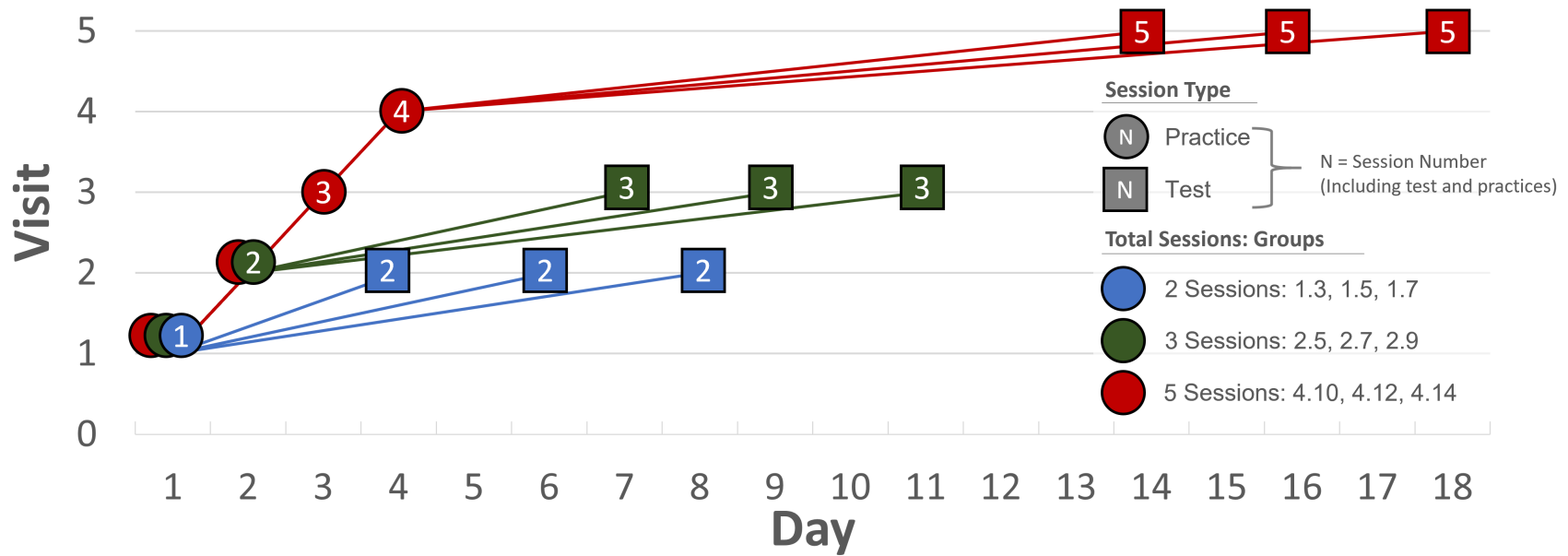


Interface



Schedule Design

9 total groups
 Groups: 2.5, n = 8
 2.7, 4.10, n=9
 Other groups, n=10

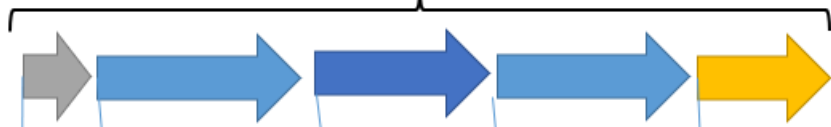


Procedure

Sessions 2,3,4 repeat the Session 1 activities without consent/demographic forms

Session 1

Training, ~35 minutes



Consent form
Demographic form

D2P2 Tutor
Some overview

D2P2 Tutor
Study the schematic (5 min.)
Draw (5 min.)

D2P2 Tutor
Some overview

Practice MENDS
1-Fault Problems
with feedback (5 min.)

Testing



D2P2 Quizzes
10 Declarative
10 Recognition

Session 5

Testing



D2P2 Quizzes
10 Declarative
10 Recognition

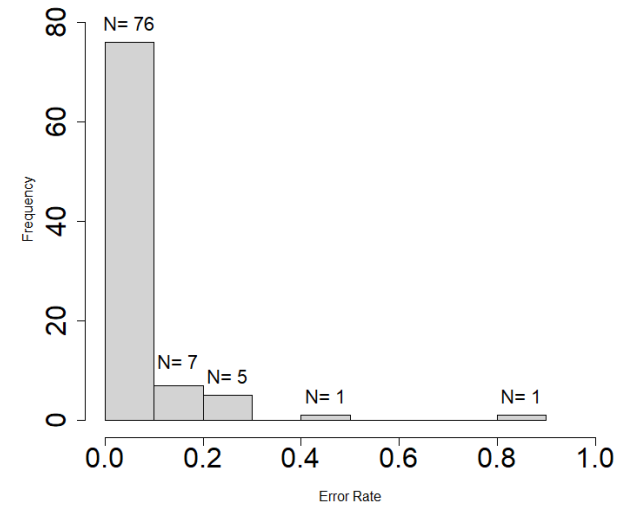
MENDS
20 Problems
w/ feedback

MODS digit
span task

Grey square	Paperwork
Blue square	D2P2/Web based activities
Yellow square	MENDS simulator
Green square	D2P2 Assessments

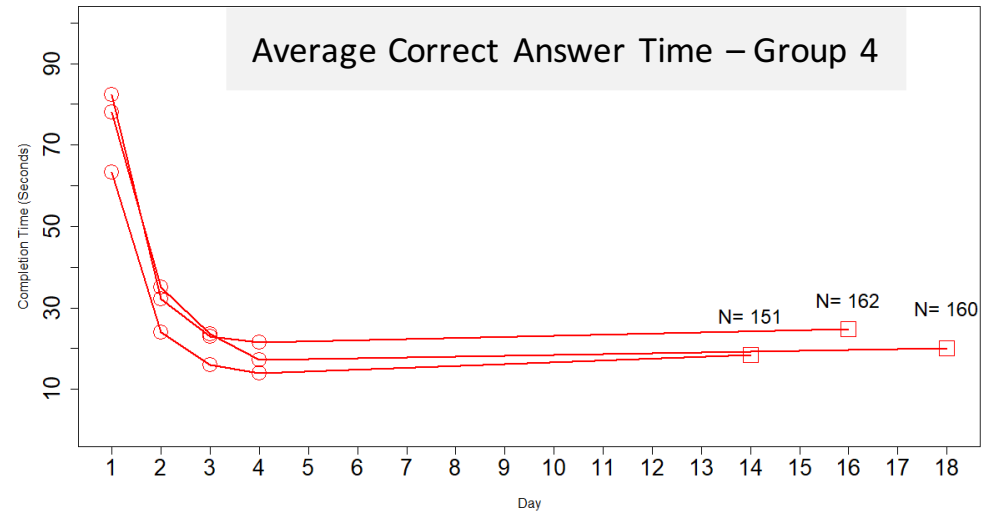
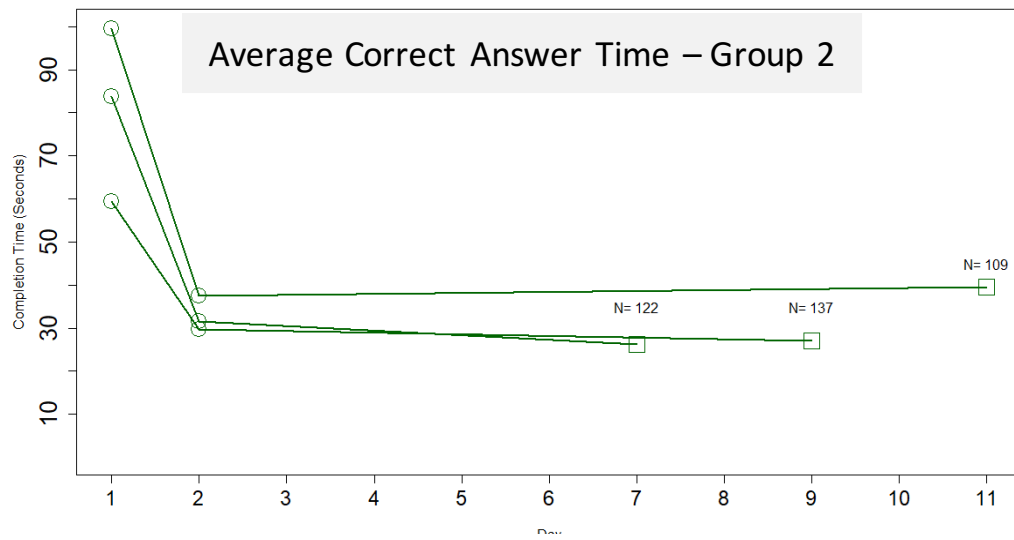
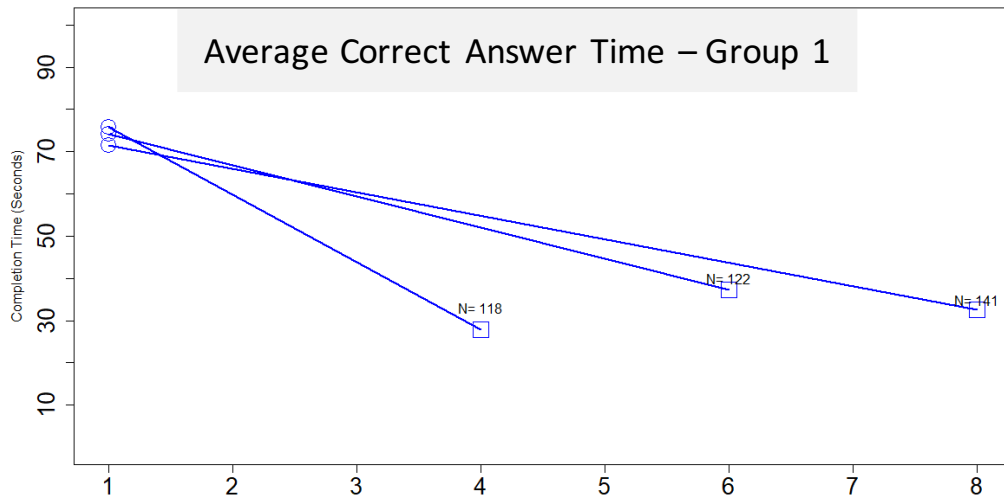
Results

- Consented participants: 105
- Dropout rate of ~17% resulting in n = 86
- Drop error > 50% [drop 43% as well?]

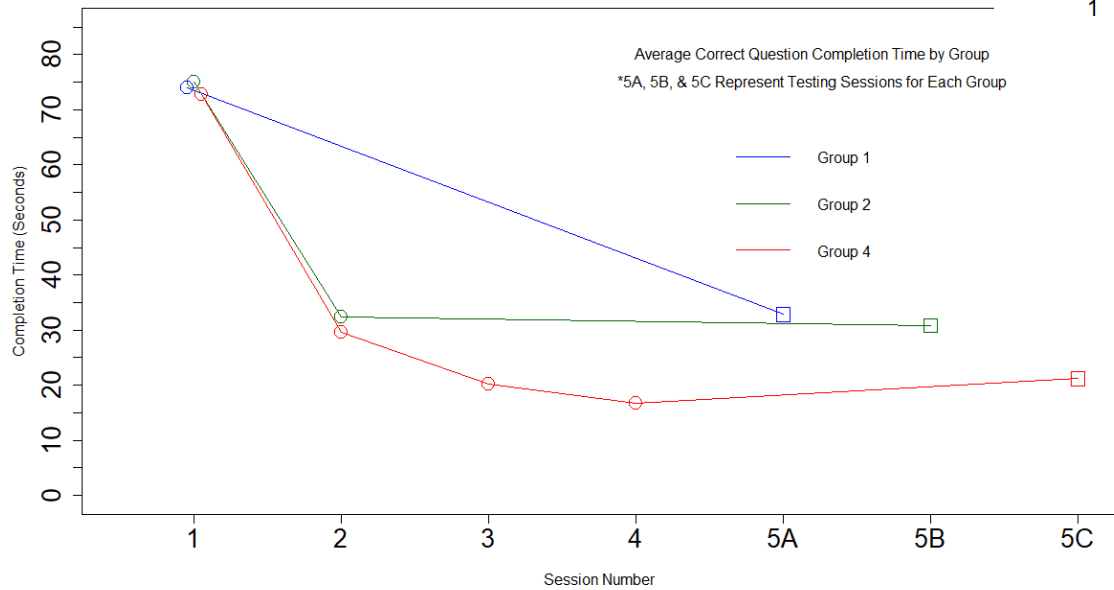


Avg # Completed, % Correct				
	All Groups	1.3,5,7	2.5,7,9	4.10,12,14
Session 1	4, 89%	4, 91%	4, 89%	3, 88%
Session 2	9, 91%		9, 92%	9, 91%
Session 3	13, 97%			13, 97%
Session 4	17, 98%			17, 98%
Session 5	20, 96%	20, 97%	20, 93%	20, 98%

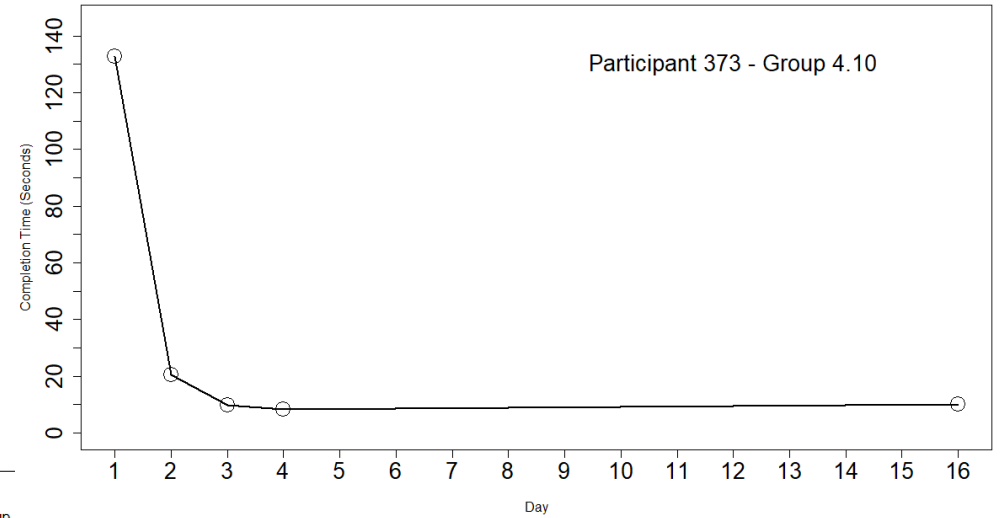
Avg Completion Time (sec)				
	All Groups	1.3,5,7	2.5,7,9	4.10,12,14
Session 1	76	72	73	82
Session 2	32		32	31
Session 3	22			22
Session 4	18			18
Session 5	29	33	31	22



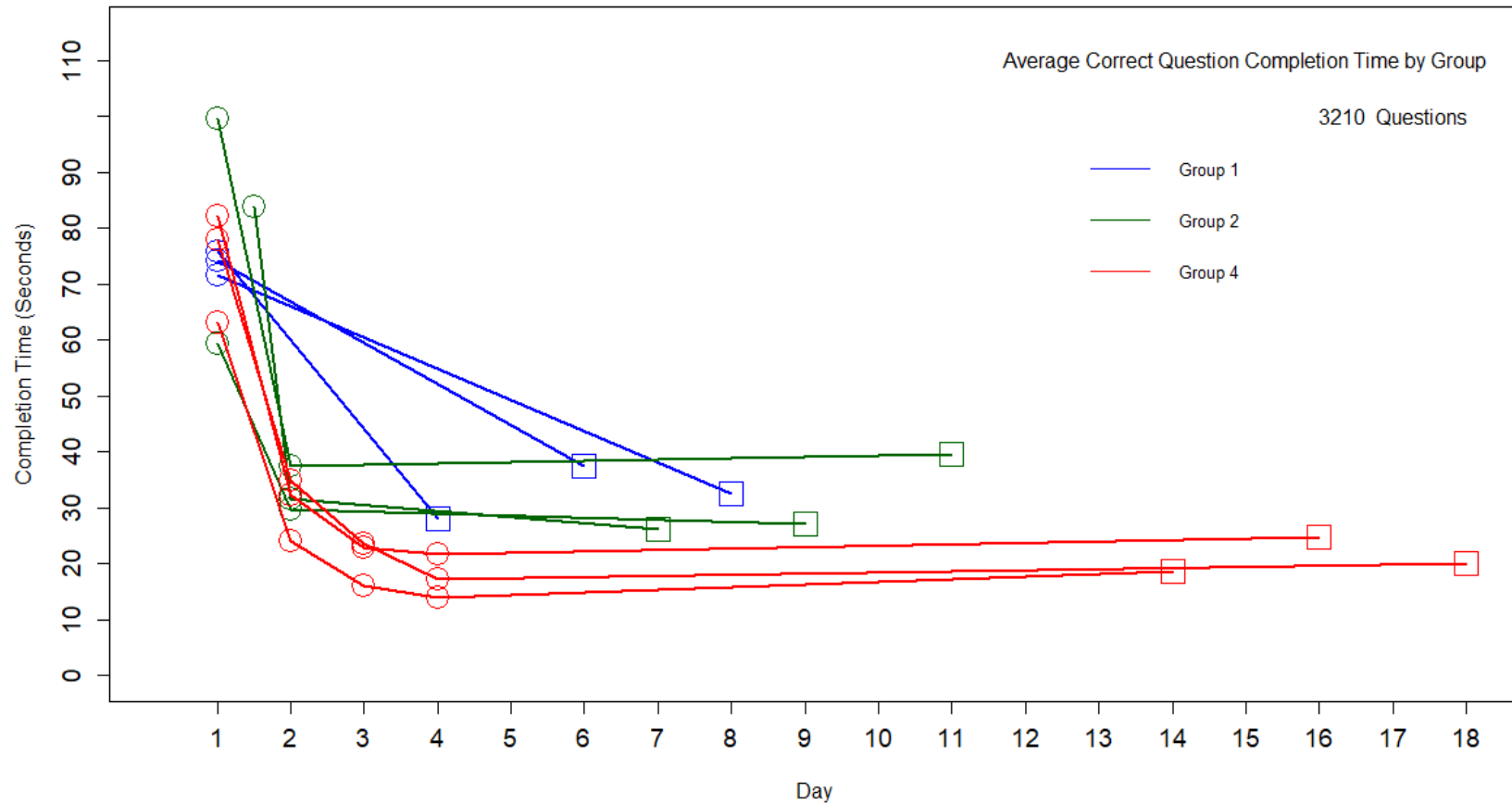
Group-level Data



Example Individual Plot



Total Group Data

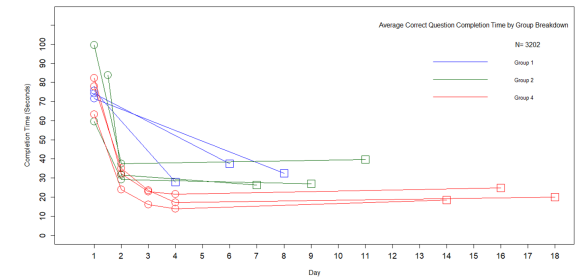


Conclusions

Our data appears to support aspects of the KRK theory's learning curve
There is a degree of learning that must be reached before forgetting can occur

Contributions

- Apparatus for teaching a procedural skill (Ben Franklin, 3 levels of fidelity)
- Protocol for running studies online (paper in progress)
- Tutor for teaching the apparatus and troubleshooting
- Data set of people learning and retaining a complex task (being analyzed)



Additional Figures

