

PROJECT NUMTEST

Assessing basic number competence without language



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INTRODUCTION

Some estimated 5-7% of children (Butterworth et al., 2011) suffer from developmental dyscalculia (DD). Universally valid **diagnostic** instruments are still lacking, as all current DD test batteries are based on **language instructions**. Consequently, their measurements are tightly linked to the specific language context of test administration.

This poses two major **issues**:

- Test results are partially **dependent on language skills**
- Test results cannot be easily **compared across countries**

The results of the following **pilot studies** are part of a research project that aims to develop a **screening** for basic number competence that **minimizes language** use by using **hands-on video instructions and animated questions**.

METHODS

STUDY 1

81 children
54% female
mean age: 6 y 7 m
65% germanophonic
35% francophonic

STUDY 2

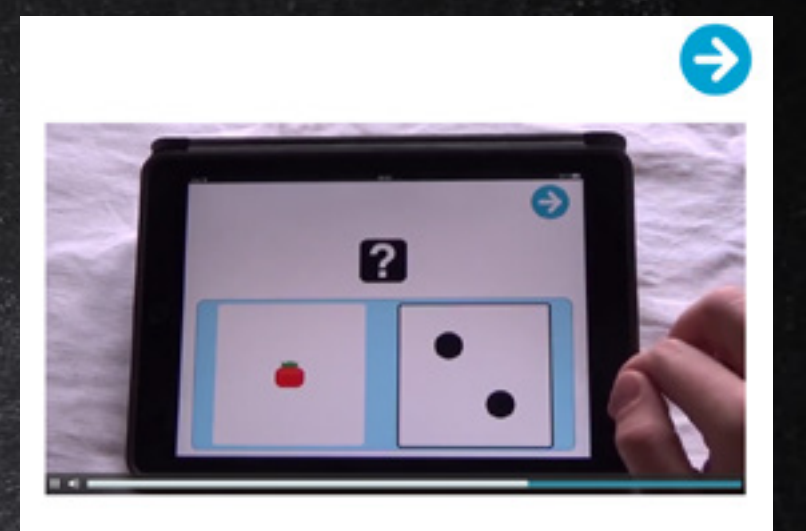
127 children
48% female
mean age: 7 y 2 m
39% germanophonic
61% francophonic

DESIGN: TWO GROUPS



Verbal instruction

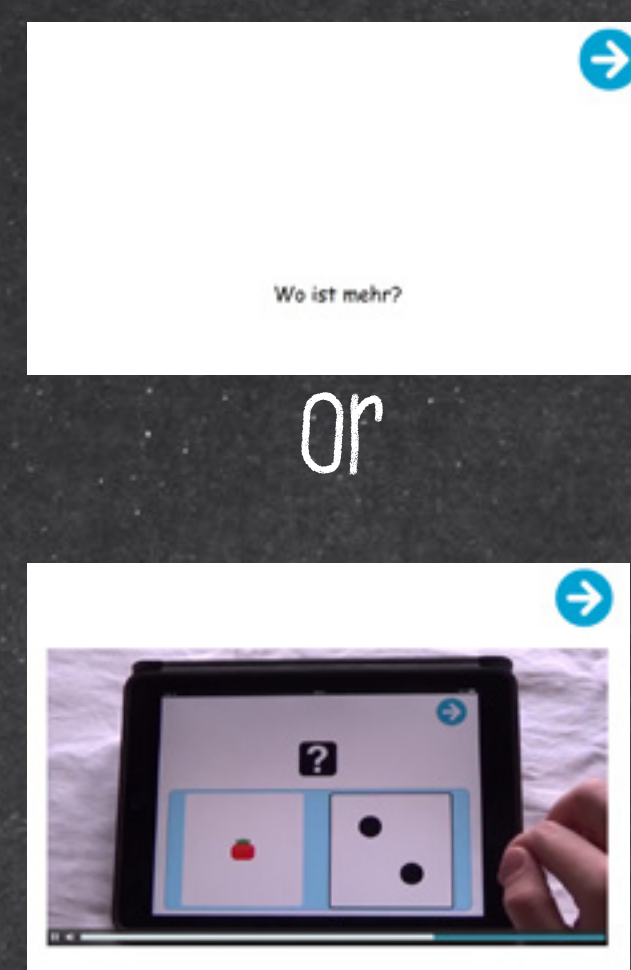
VS



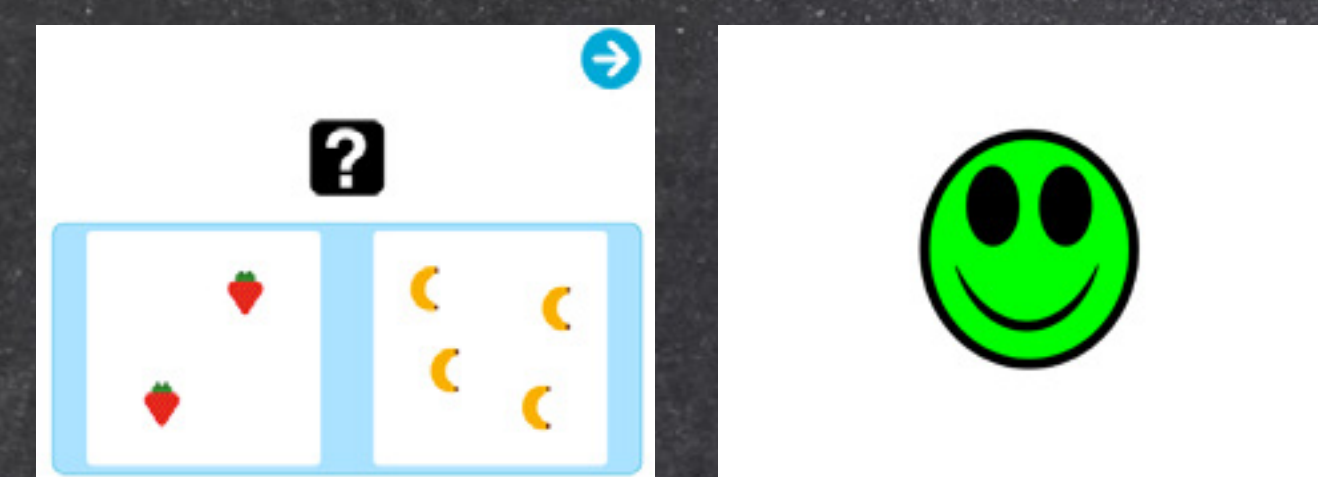
Video instruction

COMMON PROCEDURE IN EACH TASK

Three instruction items



Three practice items with visual feedback

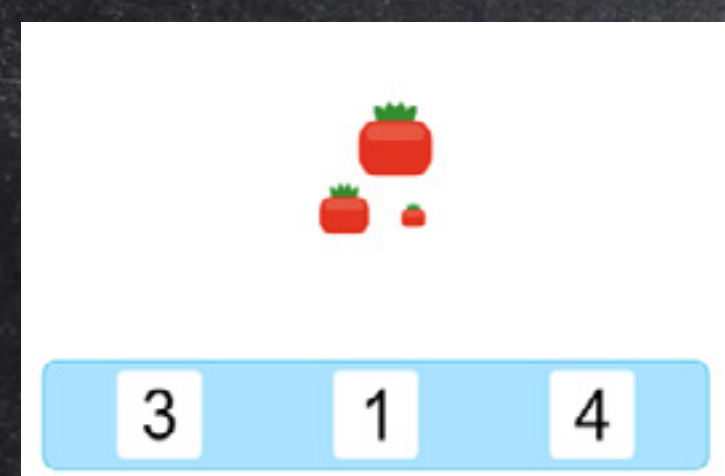


one repetition of **all practice items** in case of mistake

Test without feedback

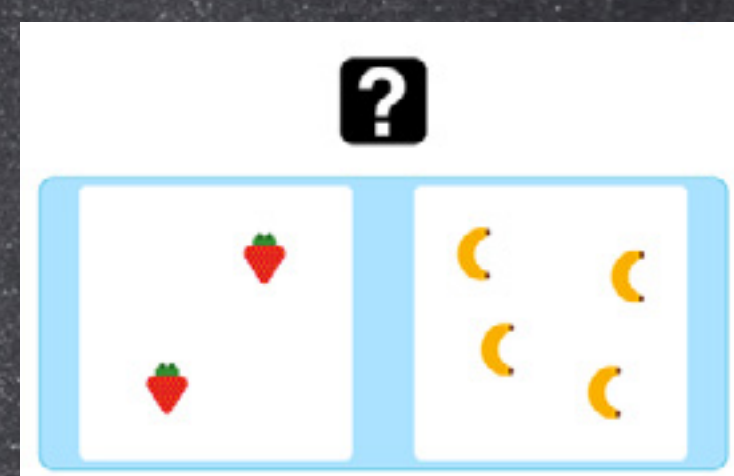
TASKS

Each task contained, when possible, **symbolic & non-symbolic** questions and answer formats.

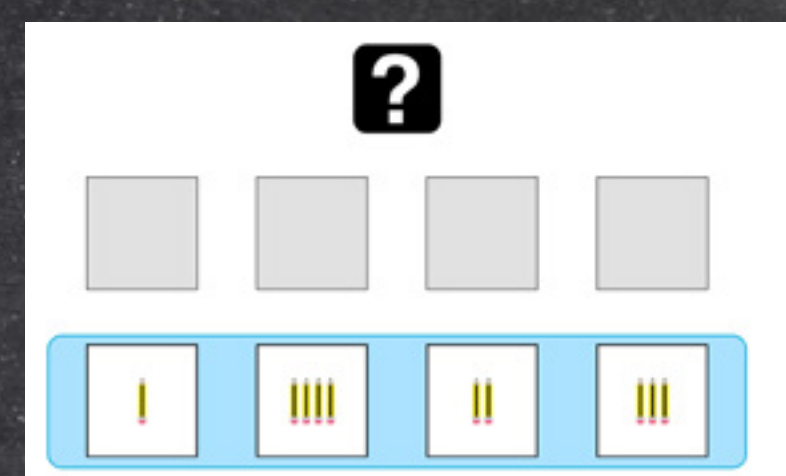


counting & correspondance

STUDY 1



comparison

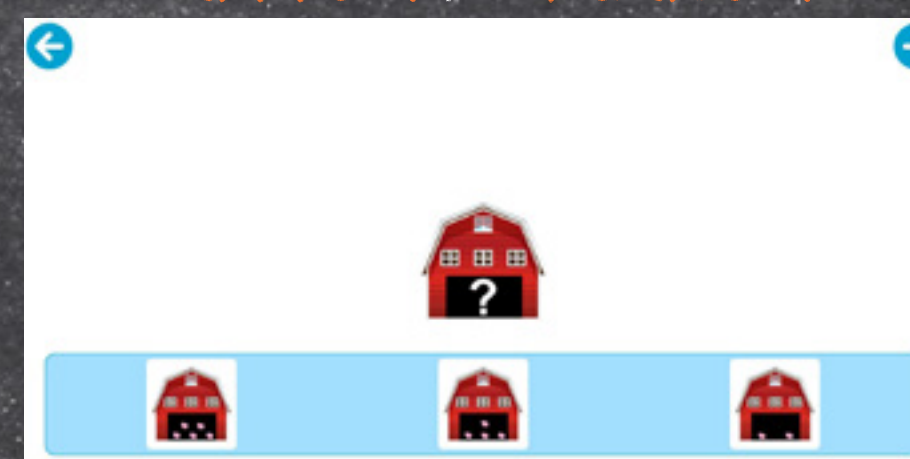


seriation

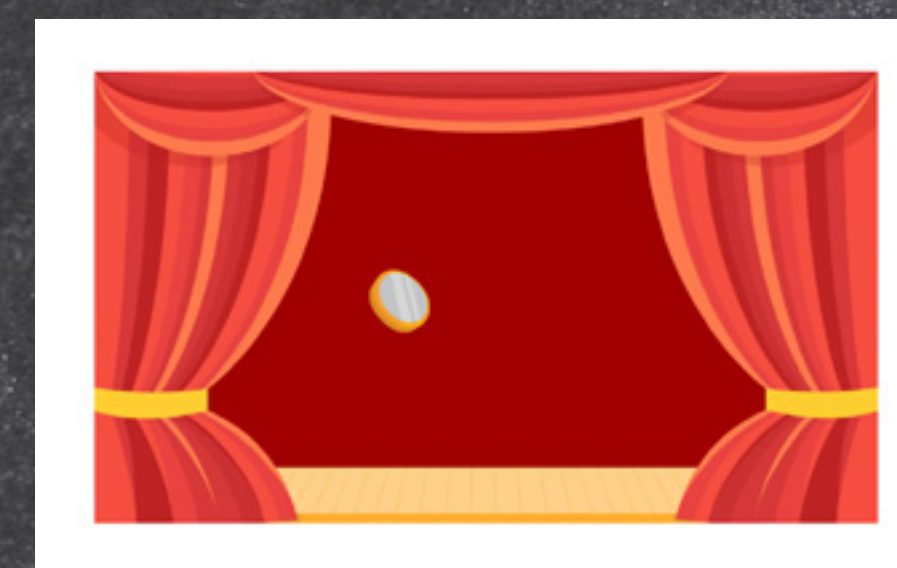
Pigs in the barn



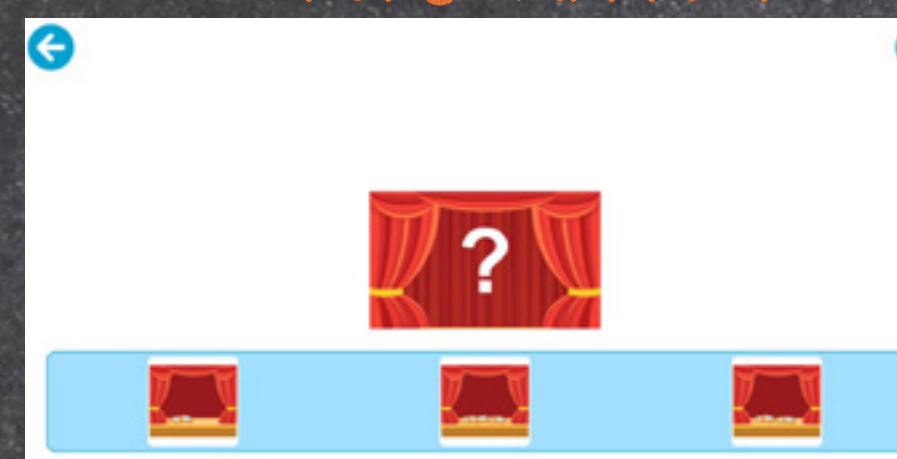
nonsymbolic addition/subtraction



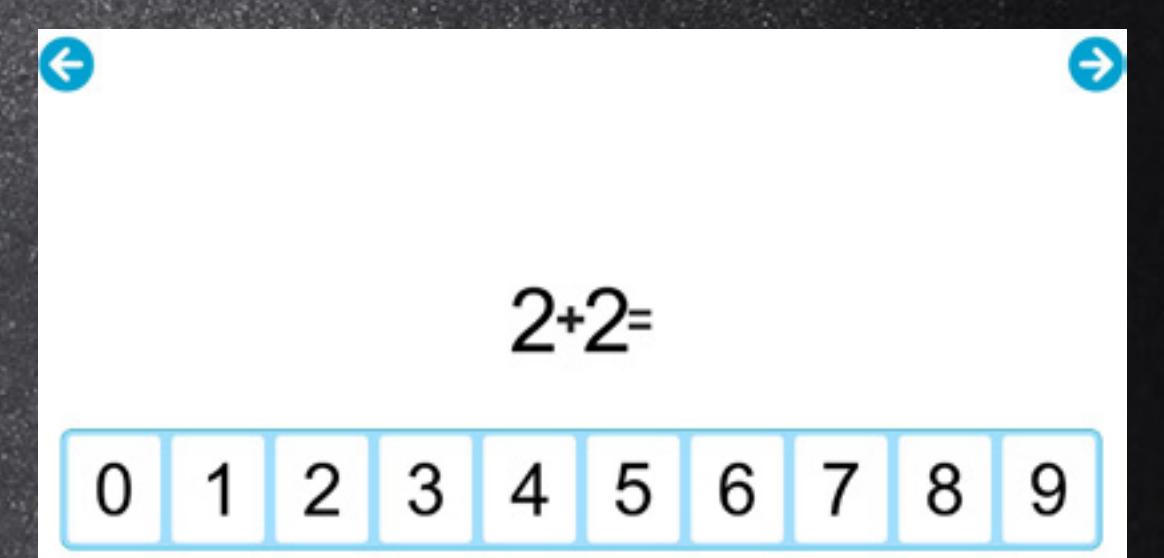
Dropping coins



crossmodal (A/V) counting & addition



Symbolic arithmetic



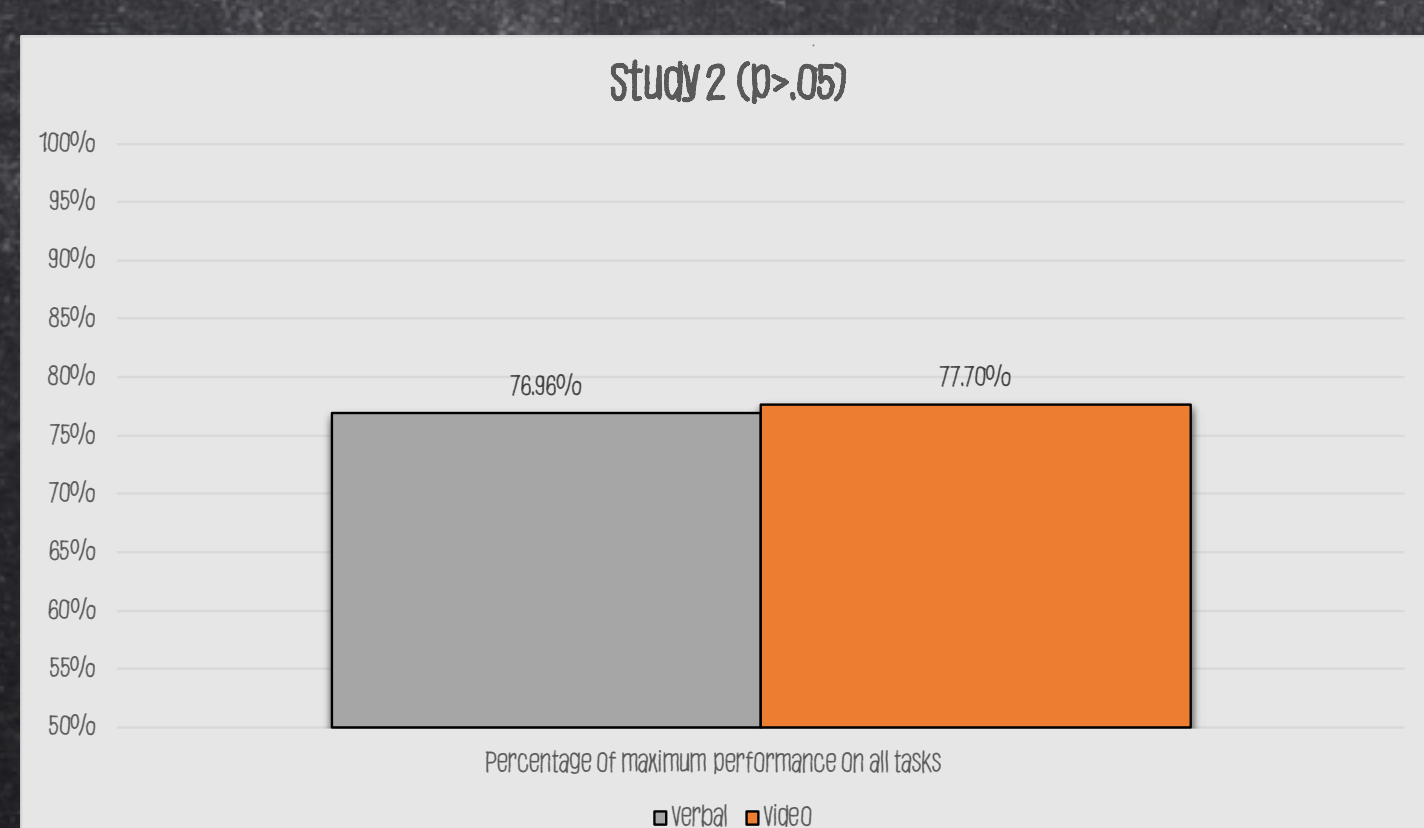
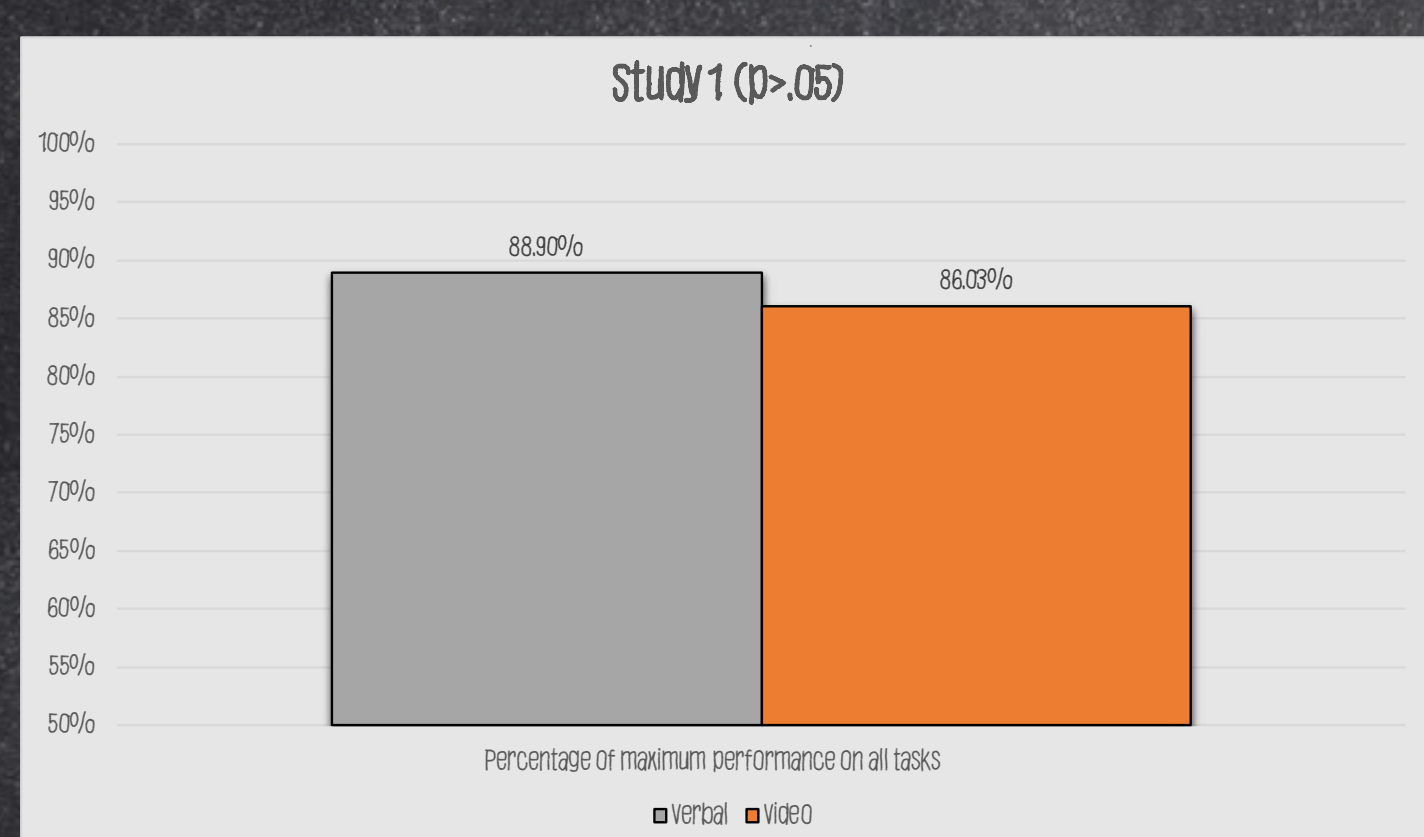
addition & subtraction

STUDY 2

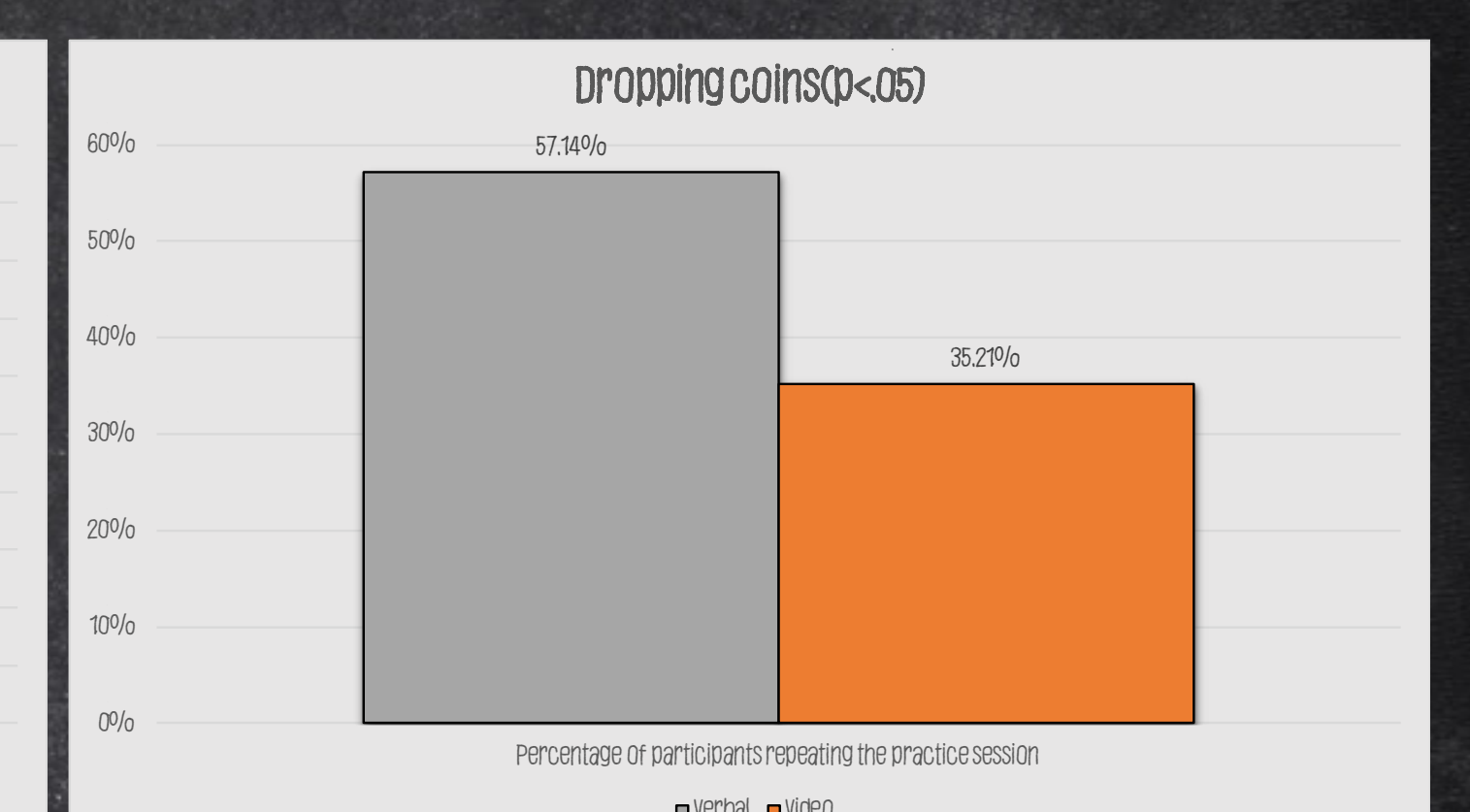
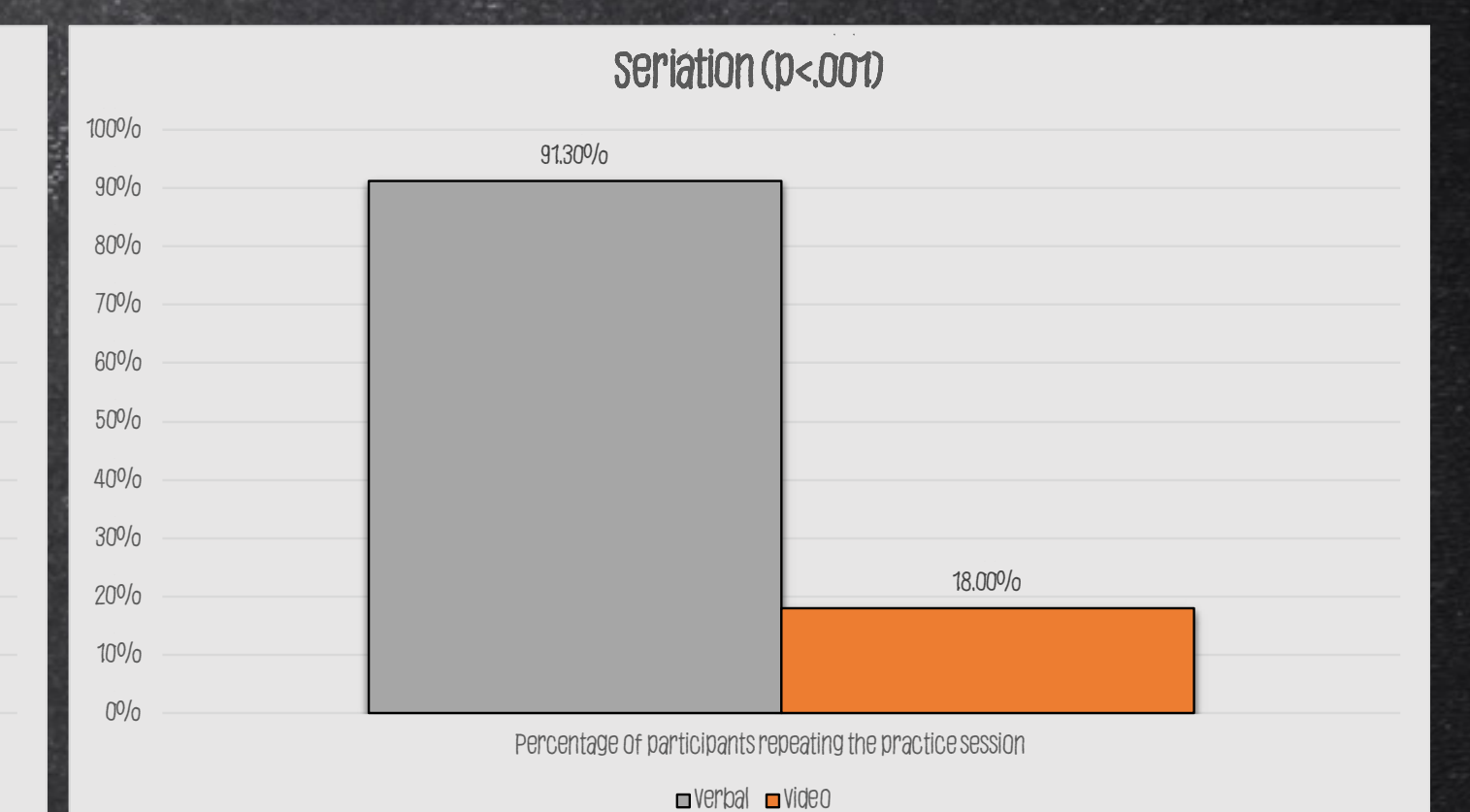
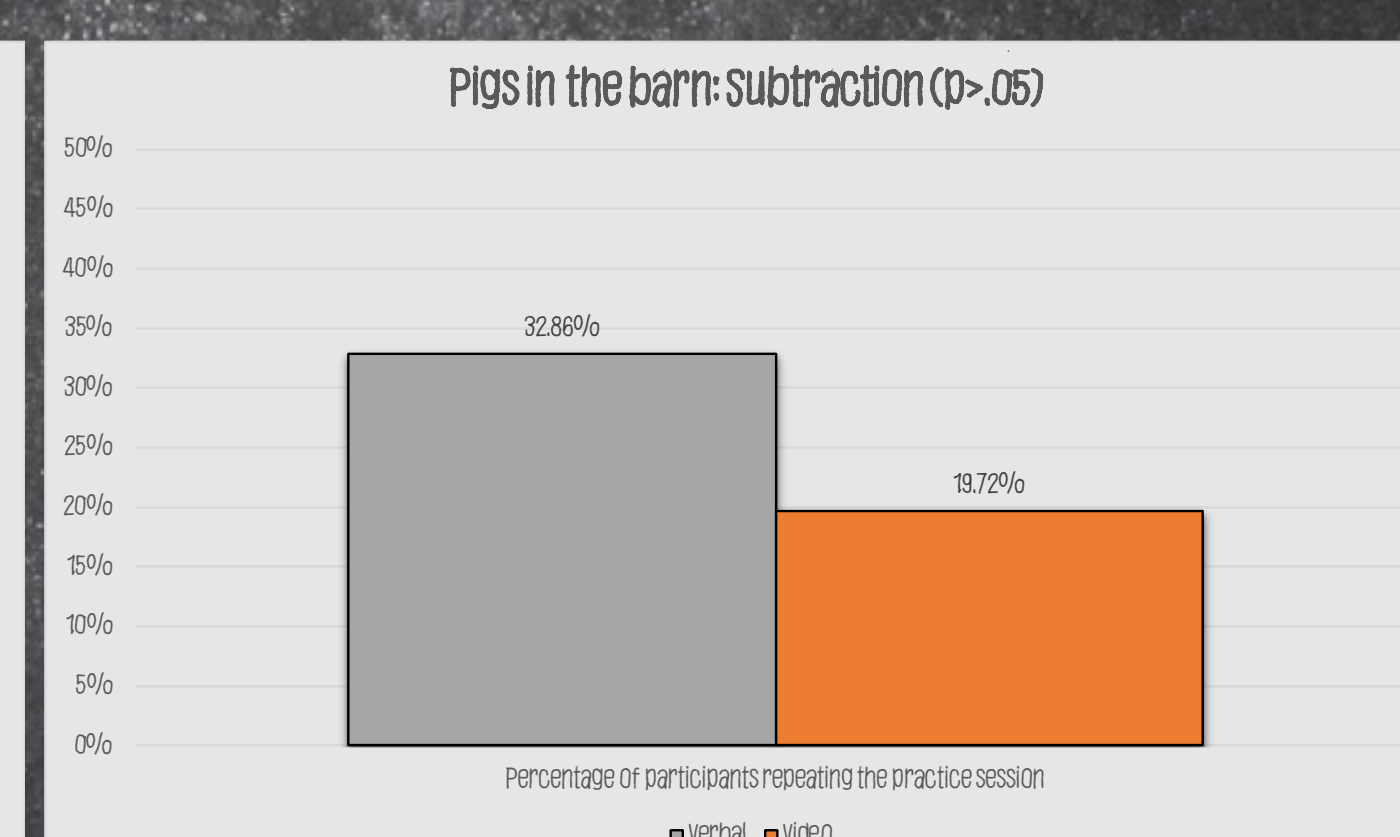
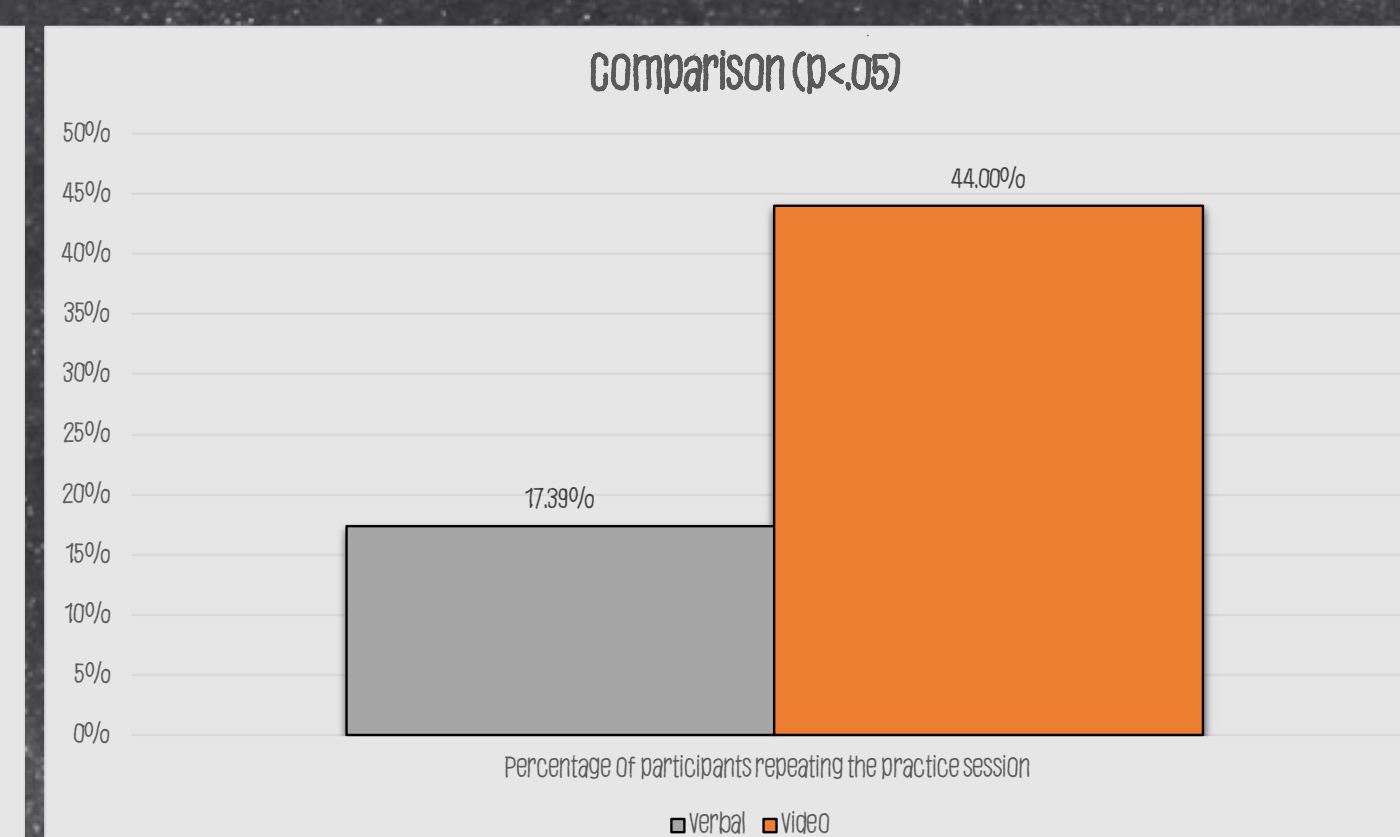
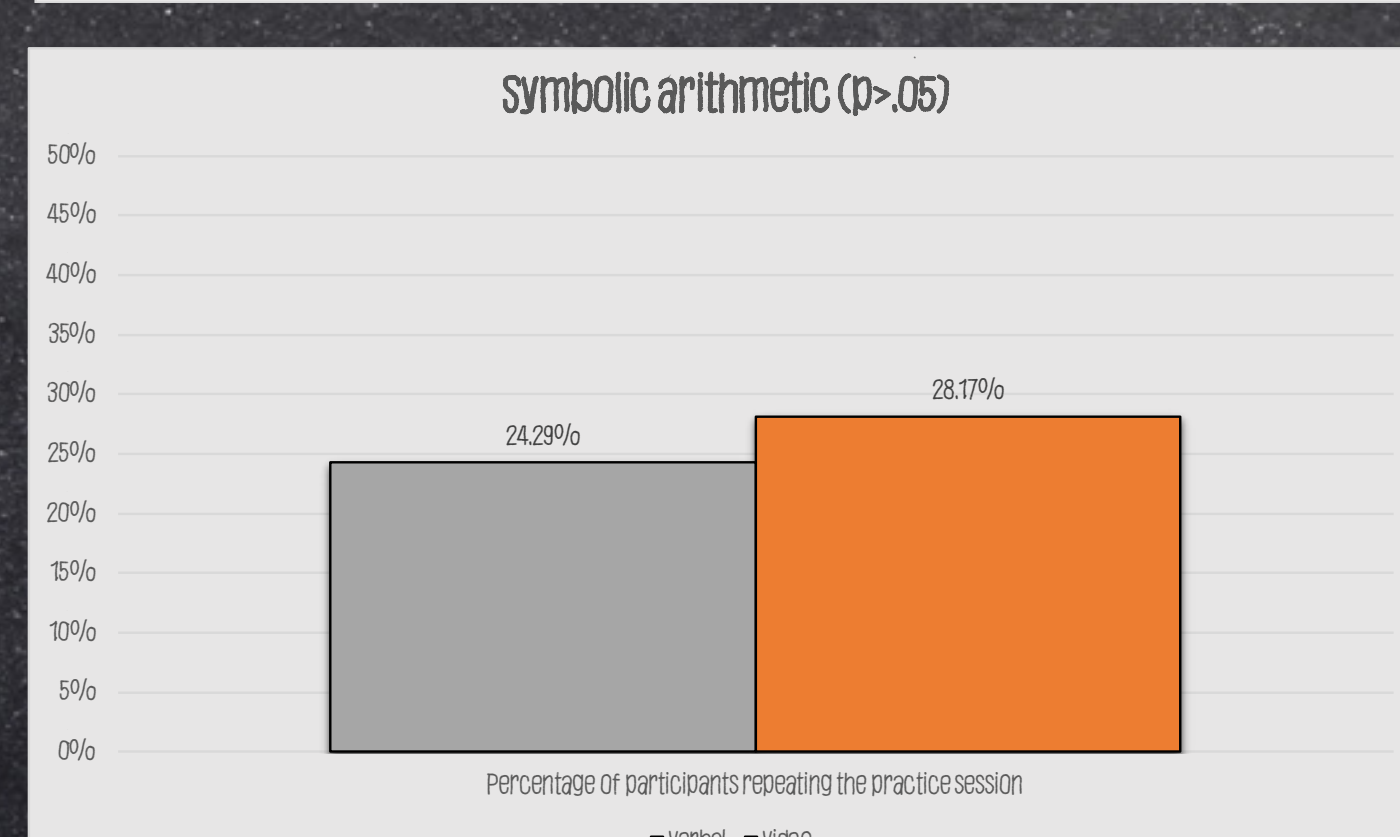
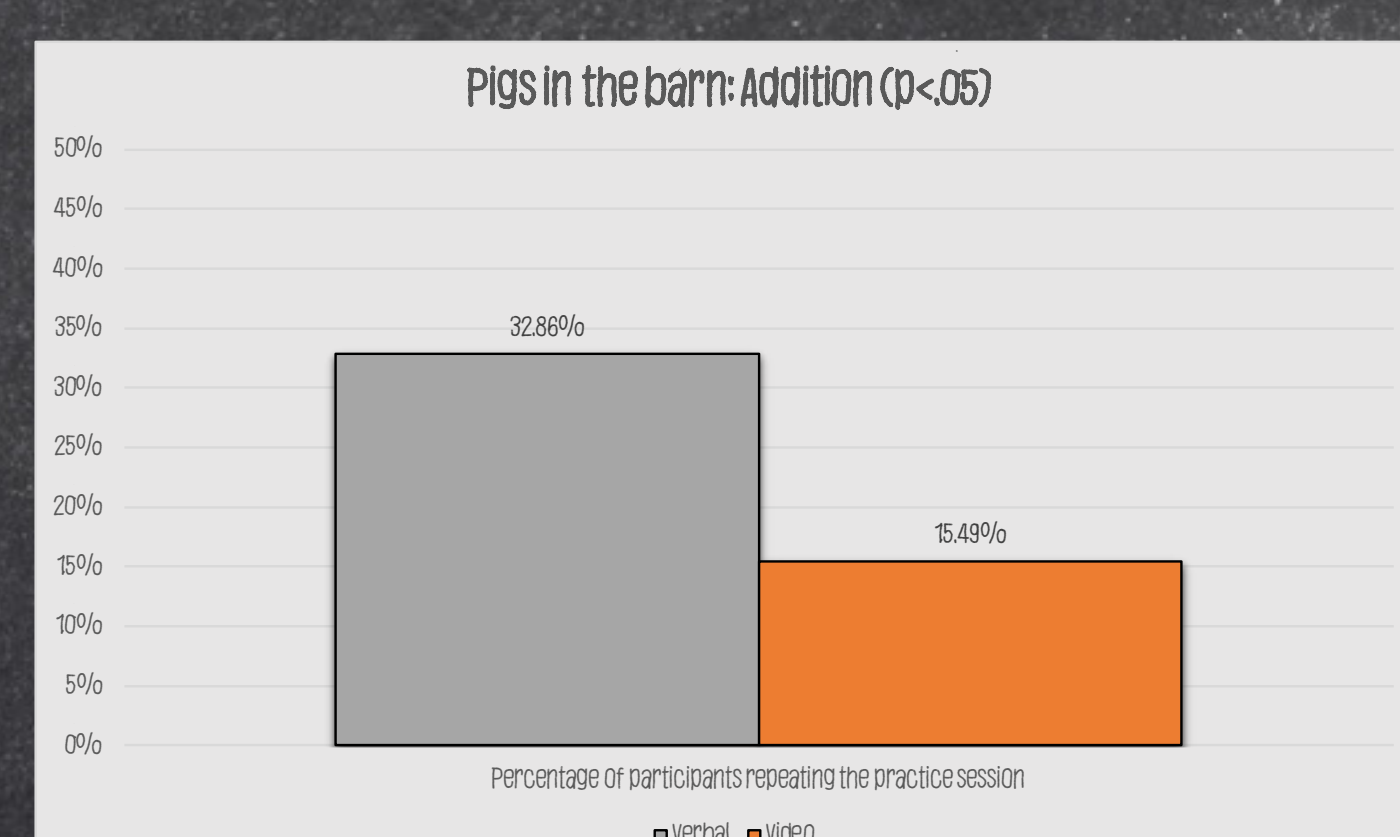
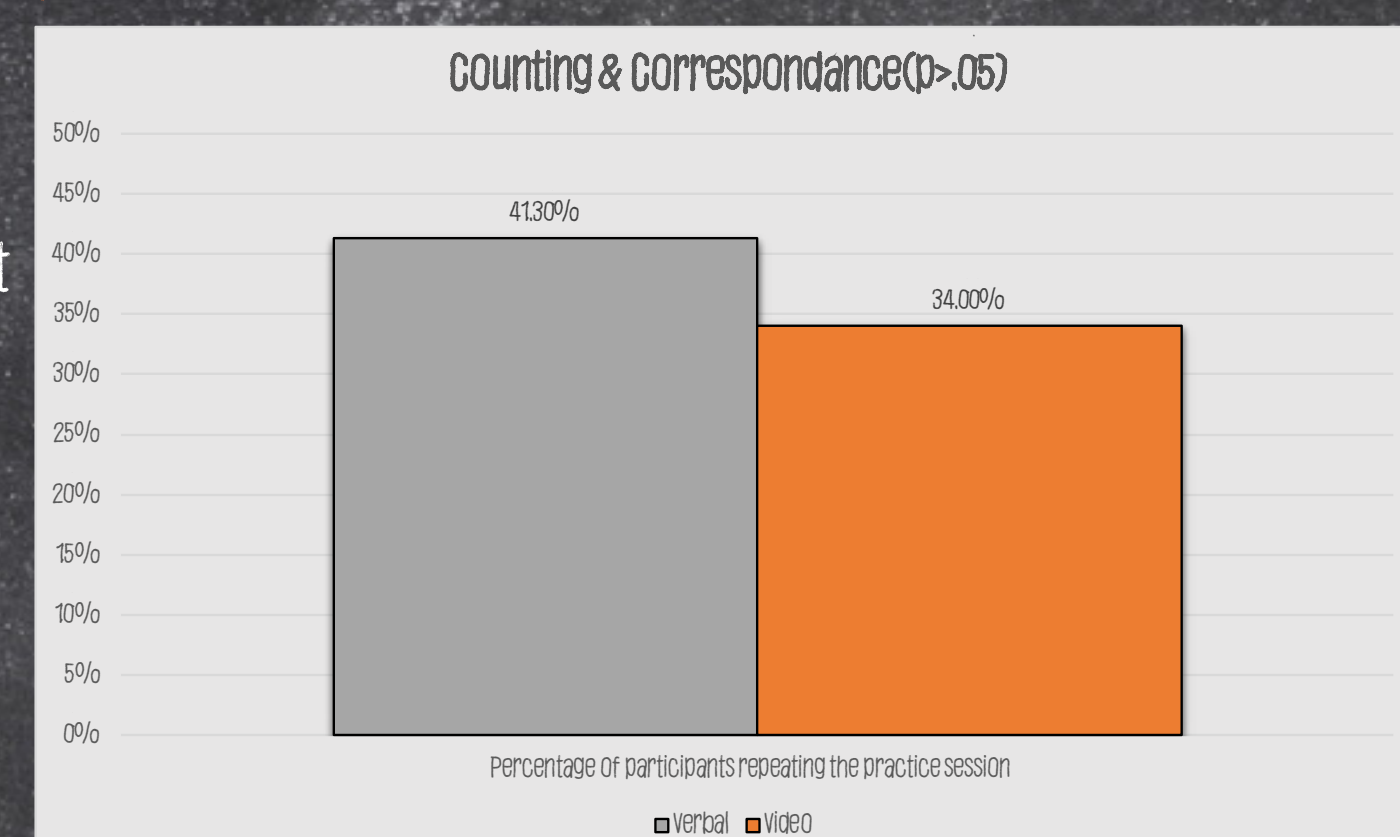
RESULTS

TASK PERFORMANCE

Here we show averaged performance over all tasks in each study. **no significant differences in performance** were observed between participants of the video and verbal instruction groups. These results suggest that it is possible to replace explicit text instructions with implicit video instructions without negatively affecting task performance.



HOW MANY CHILDREN HAD TO REPEAT THE PRACTICE SESSION?



We observed group differences in the percentage of children that needed to repeat the practice session. Less participants repeating the practice items could be translated into faster understanding of the task. Globally, **less participants repeated the practice session when they received video instructions**, suggesting a more immediate understanding of the task at hand. Nevertheless, this difference is **not always significant** and is sometimes even inverted: in the **comparison** task for example, less participants repeated the practice items when they received an explicit verbal instruction. In conclusion our results suggest that **explicit verbal instructions can be replaced by animated / video instructions without negatively affecting task performance** while often leading to a faster understanding of the task without relying on linguistic skills.

CONTROL MEASURES

We also administered a series of pen & paper control tasks:
- Symbolic arithmetic
- number comparison
- oral & written counting up to 20
The two groups **did not significantly differ** on any of those measures.

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