Neural classification with attention assessment of the implicit-association test OMT and prediction of subsequent academic success

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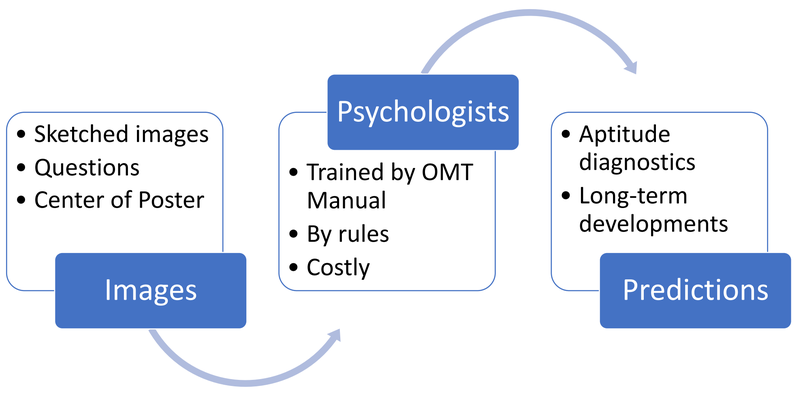
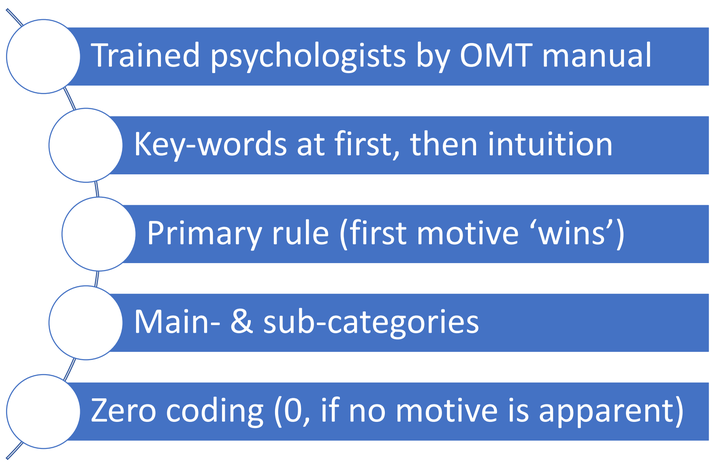
1 Problem



❖**Operant motives**
- motives are measured by a **visual test**
- participants answer the **questions** in the poster's center to nearby **sketched images**
- hand labeling is **costly,** resources are sparse
- **automation** would be valuable

2 Theory



❖In theory, operant motives predict subsequent **success** and **behavior**
❖Three motives
- **power**: have influence
- **achievement**: have success
- **affiliation**: seek social contacts

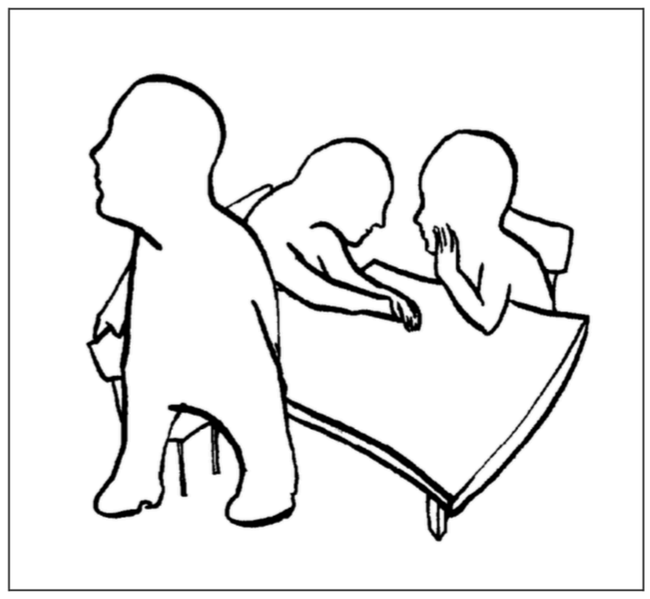
❖Measuring
- first by Operant Motive Test (OMT) **manual**, later by intuition
- according to the **rules** on the right

Examples

Affiliation

she does not take part in the conversation and turns away. bored. She does not care what the other two are talking about. Bad.

(sie nimmt am Gespräch nicht teil und wendet sich ab. gelangweilt. es interessiert sie nicht, worüber die andern beiden reden. schlecht.)



Who is the main person and what is important for that person?

How does that person feel?

Achievement

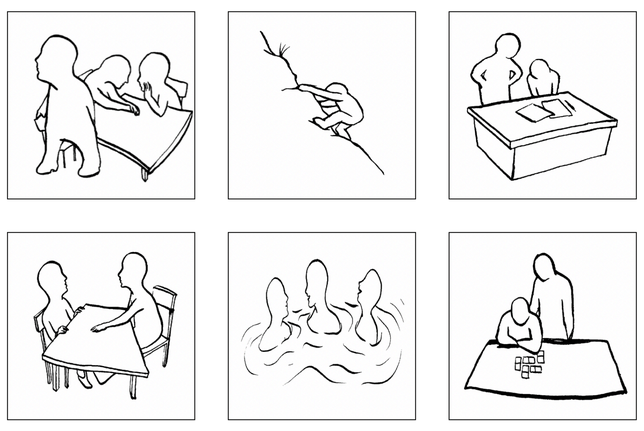
After a long discussion, she gets a drink for everyone. Mournful, depressed. A long-planned project does not show the expected success. a business plan is being made in order to close successfully.

(nach langer Diskussion holt sie allen etwas zu trinken. betrübt, bedrückt. ein von langer Hand geplantes Projekt zeigt nicht den erwarteten Erfolg. es wird ein Business-Plan gemacht, um doch noch erfolgreich abzuschließen.)

Power

withdraws anxiously. will be rebuked. Opportunity to correct the mistake.

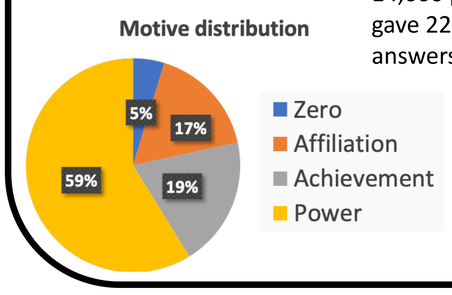
(weicht ängstlich zurück. unterlegen. wird zurechtgewiesen. Gelegenheit den Fehler zu korrigieren)



3 Method

An LSTM with attention mechanism performed best compared to multiple architectures i.e. CNN, RNN, Seq2One, RCNN, Bi-LSTM & feature enhanced networks.

The data set resulted from 14,600 participants that gave 220,859 unique answers.



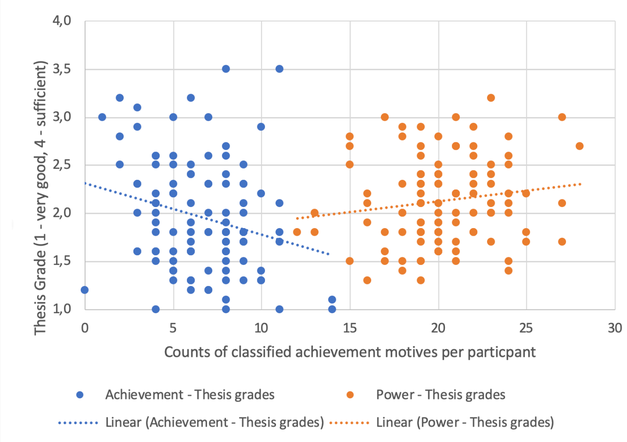
4 Results

High attention weight mass			All tokens		
LIWC	per cent	words	LIWC	per cent	words
Achievment					
cognitive mechanism	27.39	intense concentrated motivated capabilities	social	15.17	- - - -
occupation	24.66		cognitive mechanism	14.11	
achieve	23.28		other references	11.44	
insight	10.96		affect	10.49	

The assessment with LIWC showed that tokens with high attention mass align better with the OMT theory than all tokens.

gelangweilt *bored*	weil *because*	sie *she*	jeden *every*	tag *day*	0
geborgen *protected*	weil *because*	die *the*	andere *other*	person *person*	A
gefordert *challenged*	will *wants*	das *the*	ziel *goal*	erreichen *to reach*	L
zu *to*	maßregeln *disciplin*	dominant *dominant*	die *the*	andere *other*	M

A heatmap according to the attention weights displayed on four example snippets of OMT answers in German appeared to be consistent with the OMT theory.



After predicting motives, the four motives per participants were counted. By counting predicted motives and correlating them to academic grades, a weak correlation of r = -0.25 could be observed between the achievement motive and bachelor's thesis grades (in Germany, the best grade is 1).

Takeaways

Automation of psychometric measures is possible and can solve the **bottleneck** of the costly manual labeling processes. We neuronally classified the OMT with an **F1 score of 81.55**, reaching human-like performance. **Attention** weights appear to align with the OMT theory. Furthermore, we were even able to show a weak **correlation** between a predicted motive and **subsequent academic success**.