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How can *Serious Games* help to improve the assessment of children‘s language capacities in authentic communicative settings?

Nicole Weidinger, Jörg Roche, Moiken Jessen, Christian Meyer *& Team*

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Language Assessment for Children with a Migrant Background

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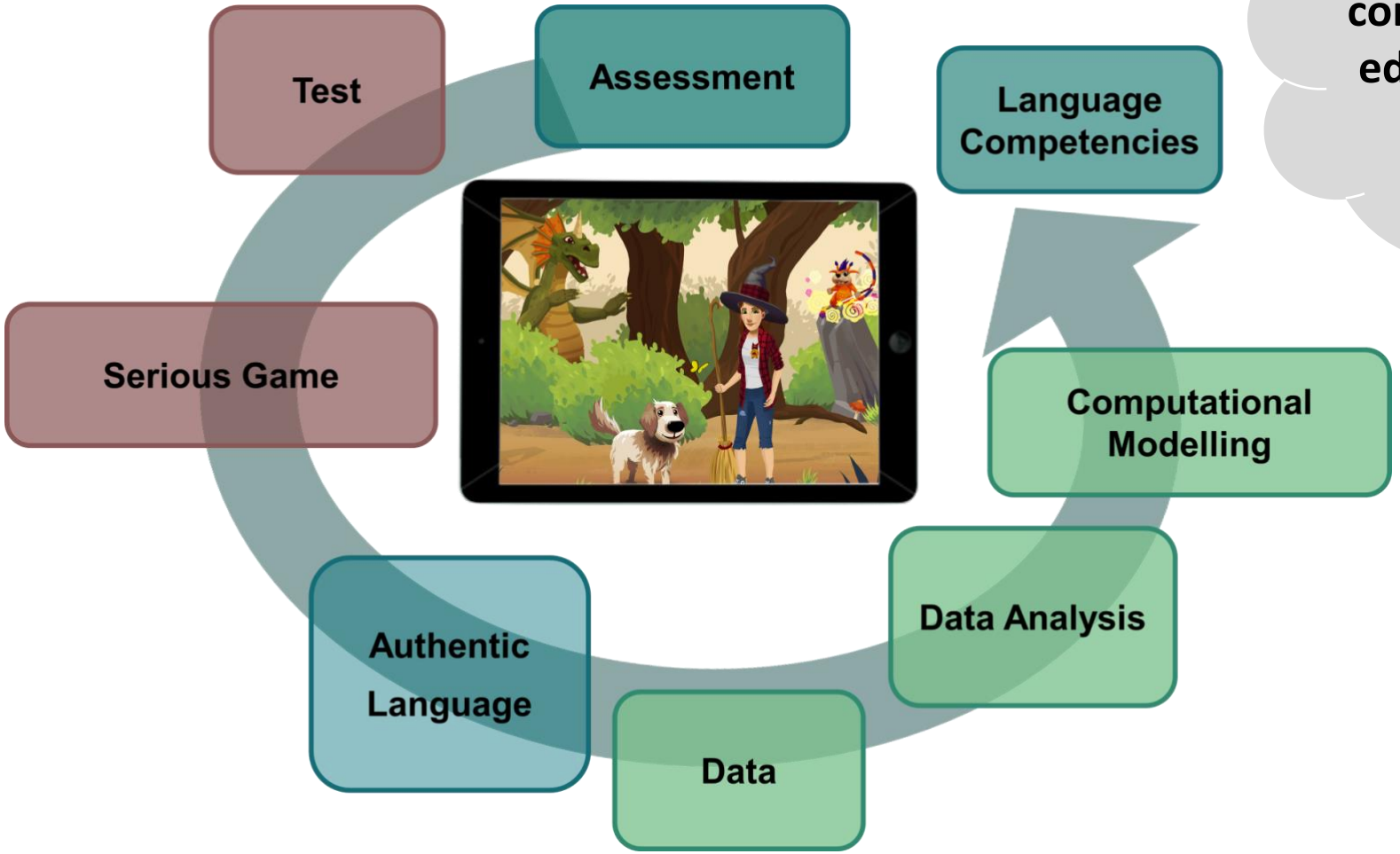
Objectives & Overview

Assessment of the proper communicative potential & educational needs of 4- to 5-year-old children



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The Potential of Serious Games for Assessment

- Promoting user engagement in assessement
- Providing meaningful and authentic (e.g. ecologically valid) contexts for assessments through interactive immersive environment
- Reducing the players test anxiety through a „stealth approach“
- Applying innovative technology → Advantages of digital software environment

Kato, P. & de Klerk, S. (2017): Serious Games for assessment: Welcome to the jungle. *Journal of Applied Testing Technology*, 18, 1-6.

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Interactive App(s) for Language Assessment

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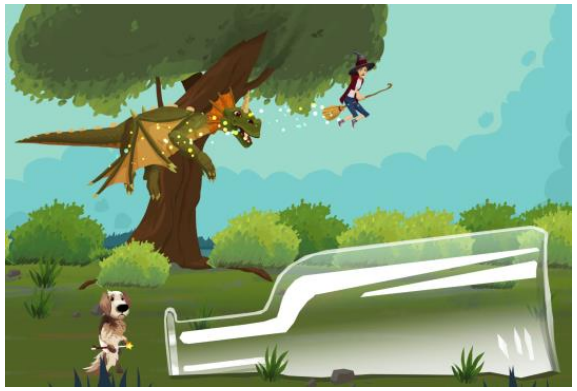
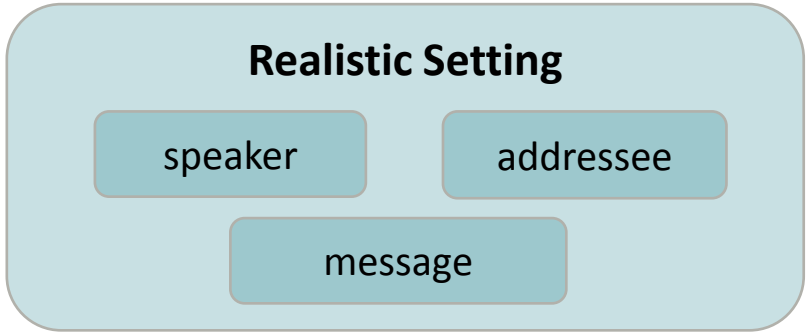
Serious Game & Authentic Language



- Game versus examination
- Childfriendly background story incorporating inspiring characters
- Player‘s quest → Children are asked to help the game‘s character
- To accomplish this task, the child talks to the character on the tablet
- Inherent motivation
- Test items are embedded in communicatively relevant situations



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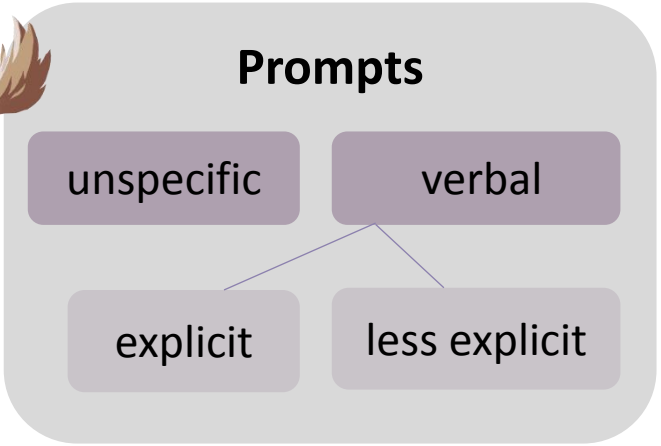
Language Learning Studies

Corpus Studies: Spontaneous speech recordings of four children aged 4;0 to 4;11 years from German longitudial corpora in CHILDES (MacWhinney 2000)

- Questions and answers:

  Children do not give full answers at once
  → Elaboration on a topic takes several turns
    - Providing specific follow-up questions helps the child to focus on the precise information that is requested.



- Spatial expressions are highly frequent
  (approx. 30% of utterances contain spatial information)

Behrens et al. 2016; Madlener et al. 2017; Roche et al. 2016

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Domain Space

- Languages show strikingly different lexicalization patterns in the expression of motion events (e.g. Slobin 1996; Talmy 2000).
- Cross-linguistic differences affect the speakers‘ focus of attention (*Thinking-for-Speaking:* Slobin 1996, 2004).
- When verbalizing a motion event, speakers choose among several means of expression those which are typical of their native language.

Implications for early L2 acquisition

- L2 learners produce spatial descriptions deviant from target language norms (e.g. Engemann et al. 2012; Ochsenbauer & Hickmann 2010).
- Even with a contact time of 24 months, children with L2 German differ from L1 children (Bryant 2012).

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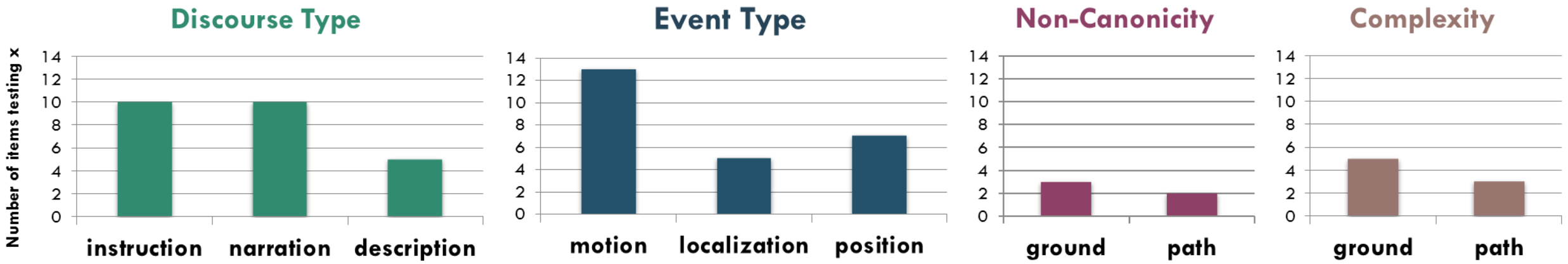
Domain Space: Testsystematics

Discourse Type	(Figure) Ground	Relation	Event	Event Type	Canonicity	Complexity
instruction	(Du) Gras *(you) grass*	durch *through*	springen *to jump*	motion	path	
narration	(Willi, Hut) großer Korb *(Willi, hat) big basket*	in *in*	legen *to put*	position		ground
description	(Flasche) Tisch *(bottle) table*	auf *on*	stehen *to stand*	localization		



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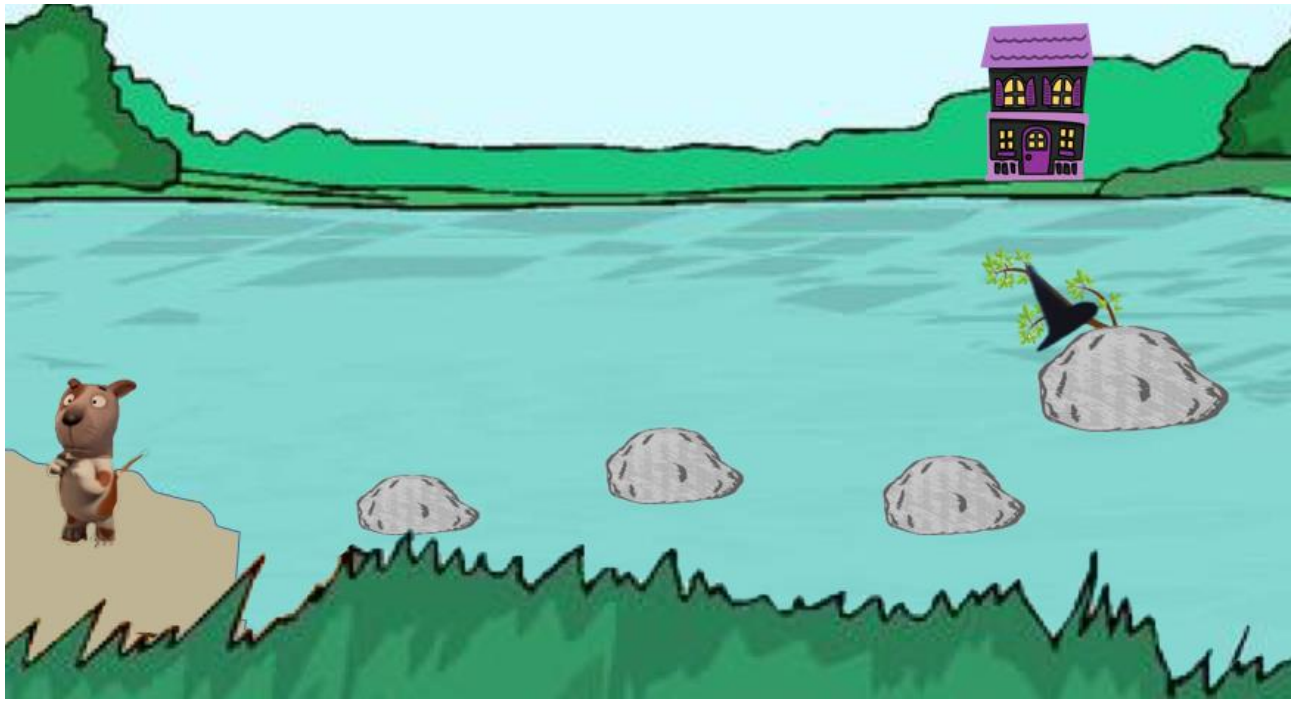
L1: Arabic, Age: 5;3, Contact Time: 10 Months



- Why are you afraid, dog?
- How do I get to the hat?
- You can swim yourself, too?
  Can‘t you?
  Or you jump onto the stone?
  Or are you afraid?
- But how?
- You can [uh] swim yourself.
- Mhm.
- Or jump on the stone then.
- Okay. I‘m gonna try that.
- Good job, dog! You made!

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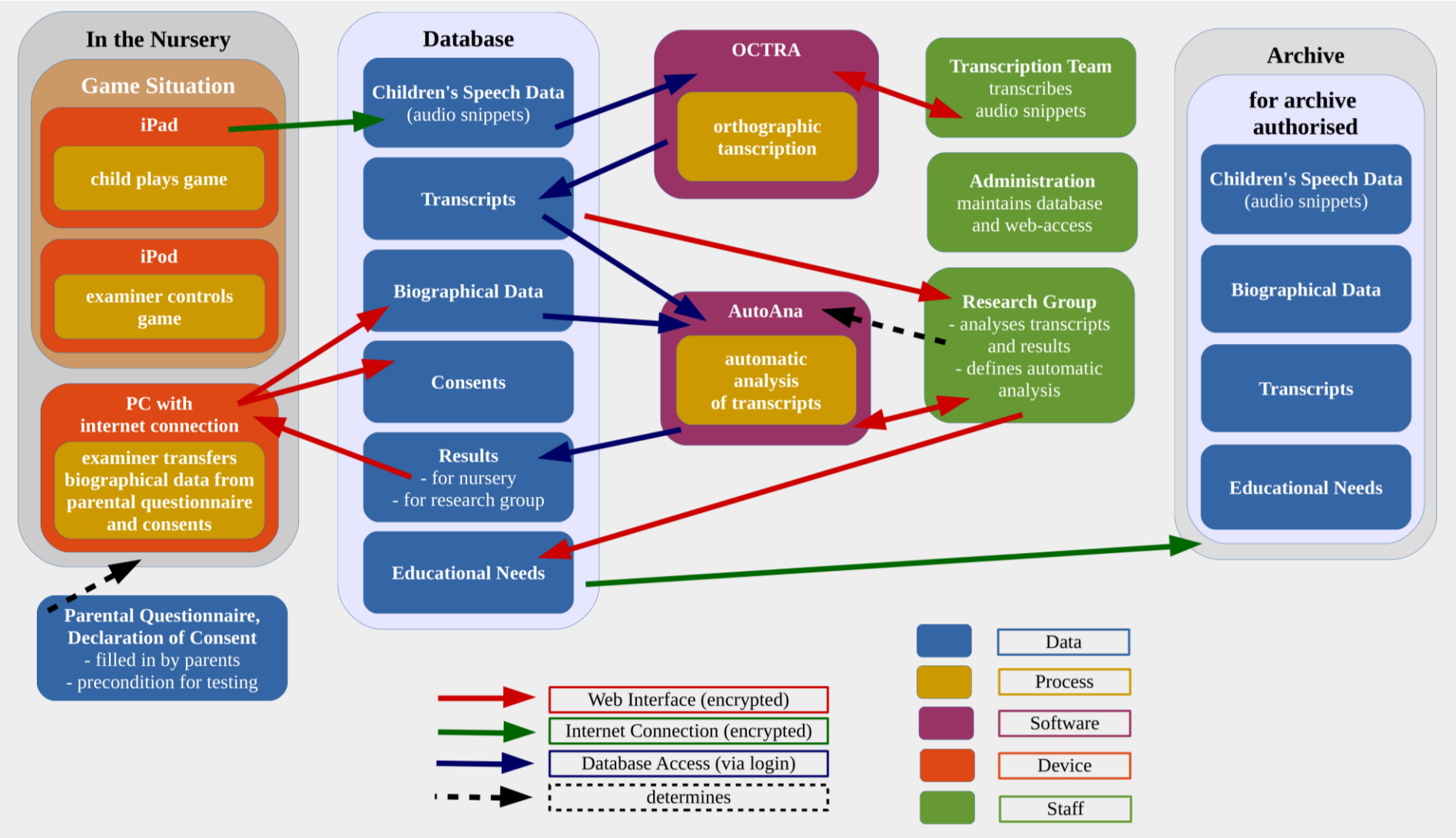
Assessment Process



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Transcription of Speech Data

- Orthographic + Tags (for e.g. noise, incomprehensible, self correction)
  - Transcription guidelines

  → Normalized speech:

  standard language (possibly grammatically erroneous)

  → Natural Language Processing

- Web application for orthographic transcription OCTRA (IPS, LMU)
  - Variable work place and time
  - Transcription of audio snippets

  → Immediate and fast transcription

https://www.phonetik.uni-muenchen.de/apps/octra/octra/login

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Data Analysis

- Measurements for analysis of language use based on orthographic transcripts
  - Focus of analysis on pragmatical aspects
- Expert ratings for
  a) language capacities (covered by test systematics)
  b) educational needs
- How are a) and b) distributed?
- How are c) linguistic features distributed?
  - e.g. diversity in use of adverbs
- Are there differences in a), b), c) between groups with different e.g. L1, age, contact time with German?

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Automatic Prediction of Educational Needs

- Which *computational* linguistic features are suitable to model the language capacities and educational needs?
  - Which language capacities require assistance?
- Computational features
  - Pragmatics modelling through game set up (known story, scenes)
    - e.g. coverage of intended use of motion verbs
  - General language use
    - e.g. use of lexical resources
- Connection to data analysis: Which linguistic features are most discriminative?

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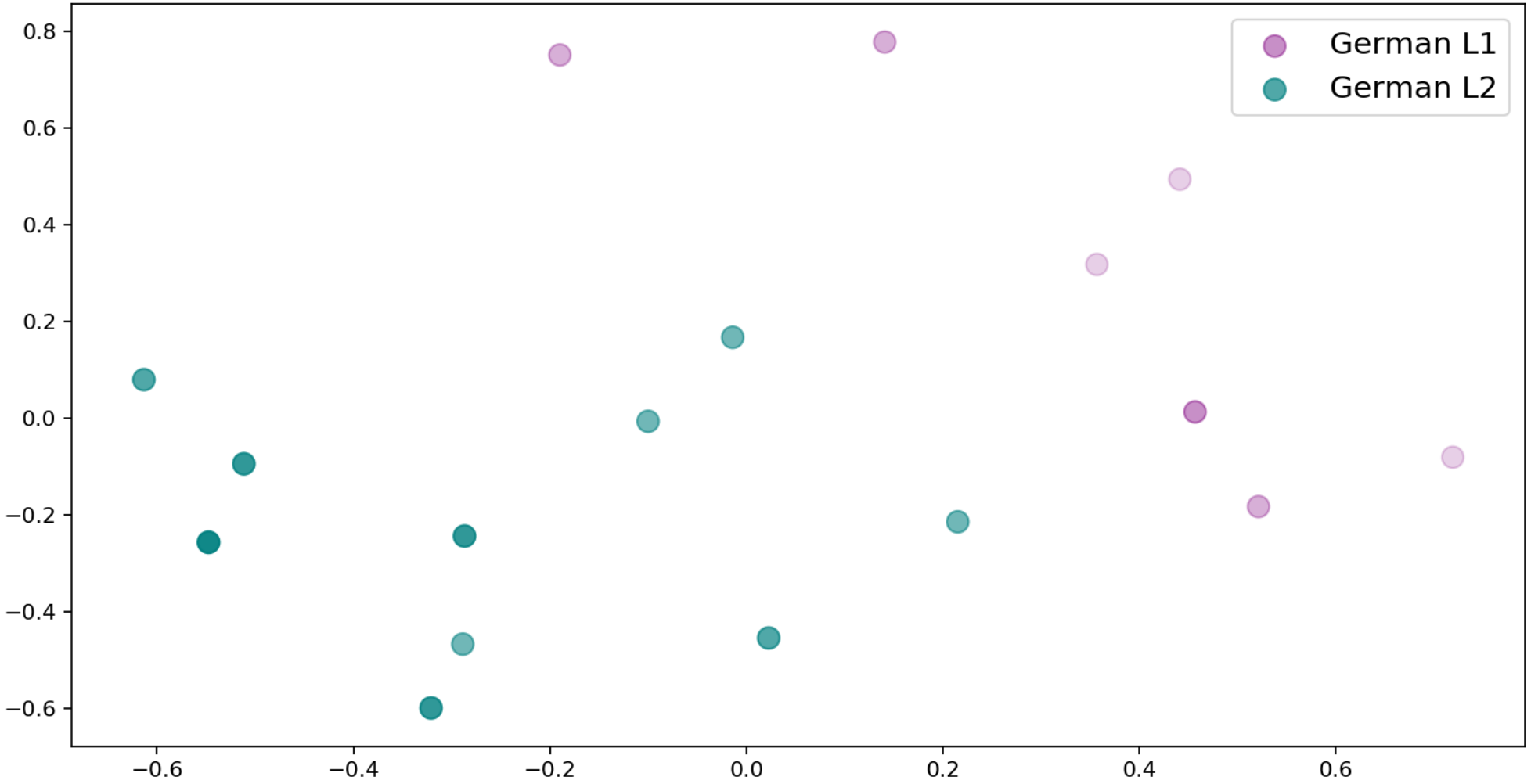
Projection of Feature Space



Projection of feature vectors by Multidimensional Scaling (sklearn.manifold.MDS(metric=True)).
Included features: features from test systematics, features for adverbs and prepositions based on diversity in usage.
Light color for no educational needs, intense color for high educational needs.

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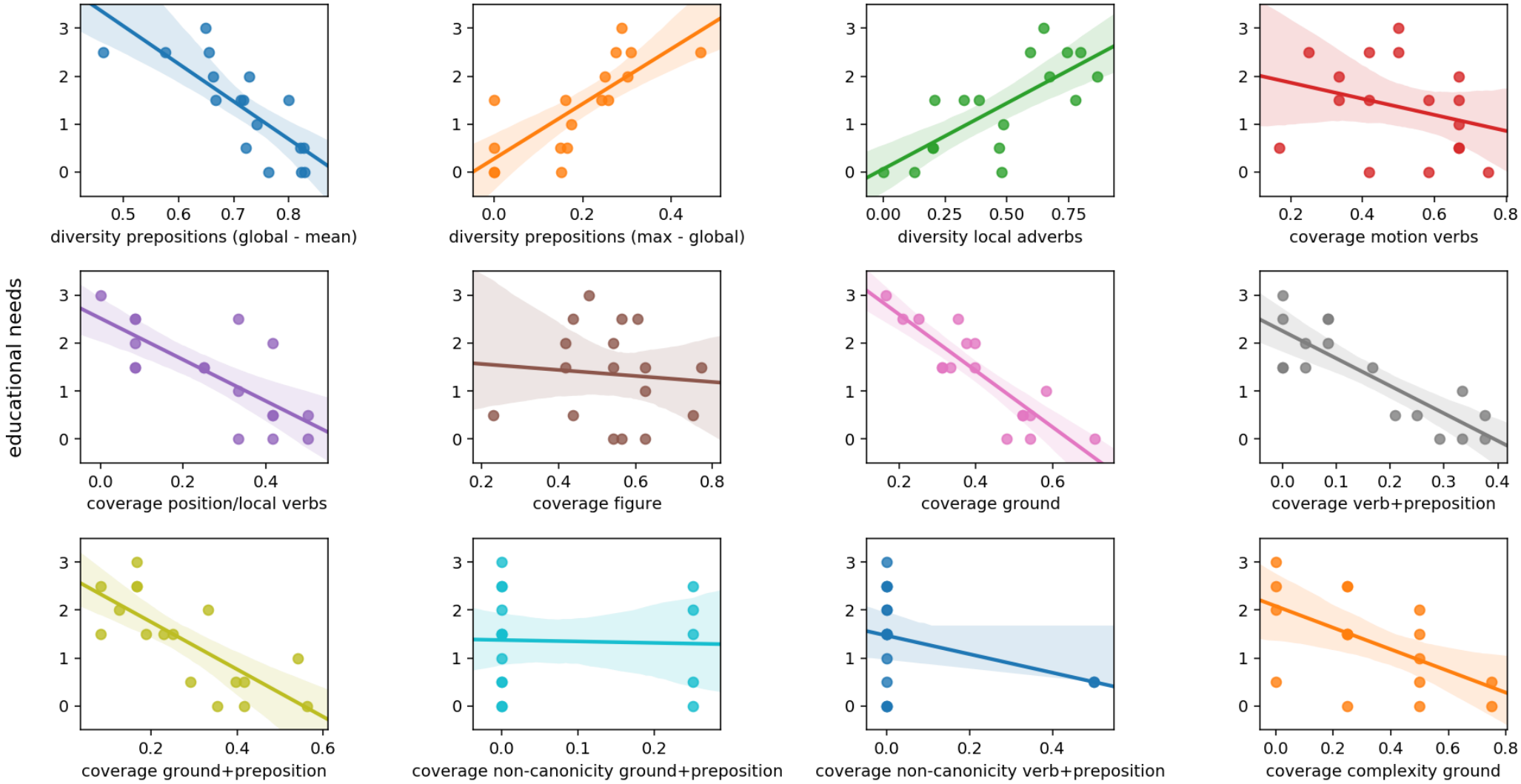
Overview Preliminary Features



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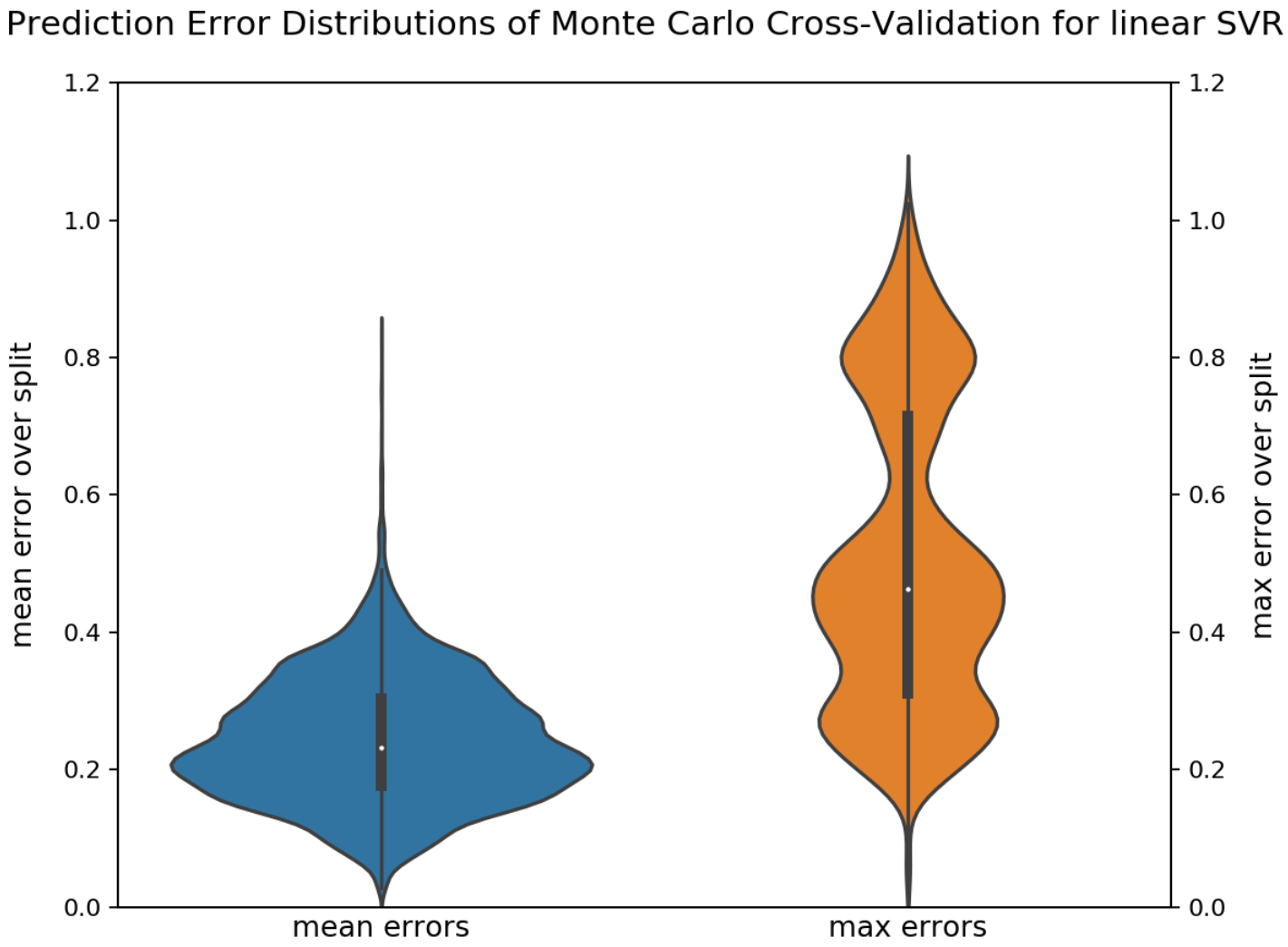
Prediction Error



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Future Perspectives

- Pilot testing of the App: 120 children aged 4;6 to 6;0 years with German as a first and second language
- Validation studies: Expert ratings, correlations with existing tests
- Usability testing of the Apps
- Adding more domains to the assessment tool (discourse, definiteness, possession)
- Standard setting
- Incorporation of spoken language features

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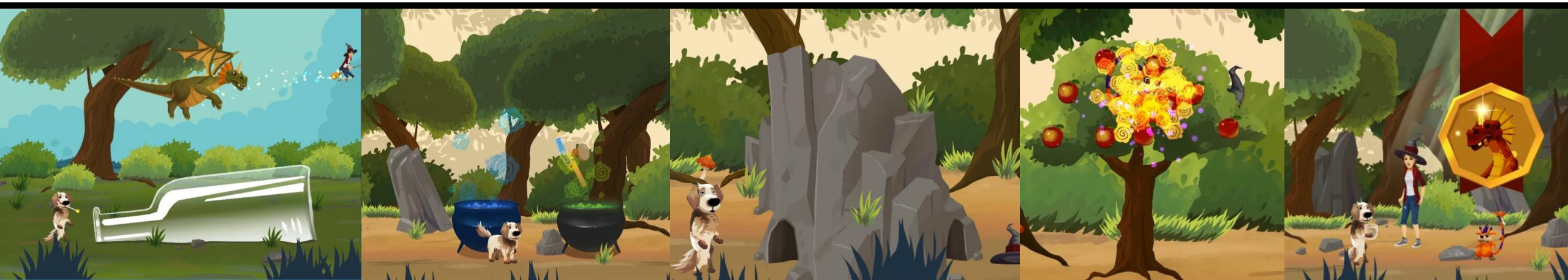
App Demonstration

Unspecific prompt:
Mmmh?

Verbal prompt (1):
How do I get to the hat?

Verbal prompt (2):
Oh no, how exactly? I don't get it.

Thank you for your attention!



Acknowledgments

- ***Daimler and Benz Foundation*** **and all members of the Ladenburger Kolleg:**

  Wolfgang Klein, Gabriele Kecker, Svenja Uth, Stefanie Haberzettl, Maike Schug, Giulio Pagonis, Natalia Kapica, Elisabetta Terrasi-Haufe, Christoph Draxler, Heike Behrens, Katrin Skoruppa, Karin Madlener, Dirk Ifenthaler, Jan Delcker, Frank Thissen, Marcus Hasselhorn, Wolfgang Woerner

- **Student assistants:** Sarah Faidt, Mitra Shateri, Agnieszka Kubacka-Mauer, Nicole Vogl

- **NEXT Munich**

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