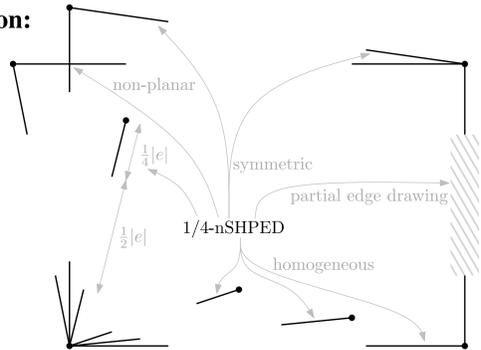


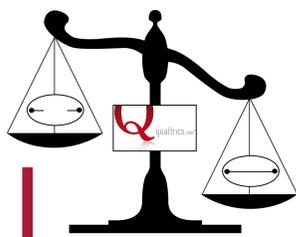
Introduction

Definition:



Previous Work:

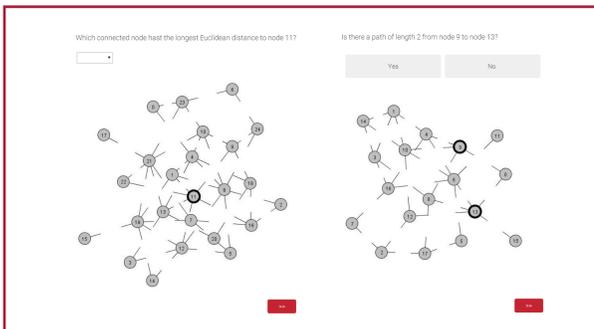
- [5] user study directed graphs ✓
- [3] positive results undirected graphs ✓
- [2] negative results undirected graphs ✓
- [4] practical application (force-directed algorithm) ✓
- user study undirected graphs ...



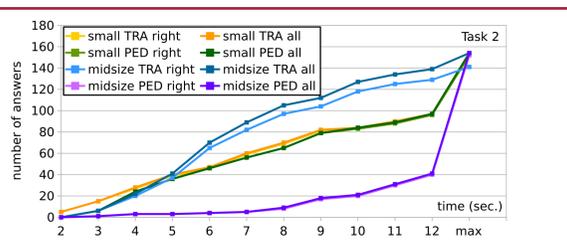
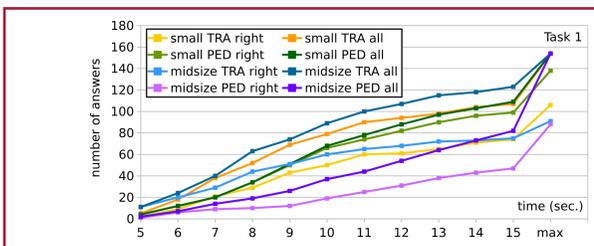
Hypothesis

The 1/4-nSHPED model is more readable and understandable than the traditional straight-line drawing model in terms of completion time and error rate for tasks testing adjacency and accessibility of vertices.

Online-Study



Answers Split by Time



Design

The Graph [1]

- randomly chosen
- vertex connectivity

The Layout [8]

by force-directed layout algorithm

The Generation

- chose v and w s.t.
- unique solution ✓
- \notin convex hull ✓
- min. degree ✓

The Introduction

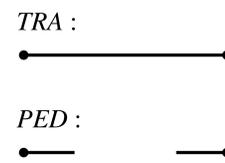
- explain model:
- definition ✓
- idea of model ✓
- example ✓

The Size

small :
18 vertices, 30 edges

midsize :
25 vertices, 47 edges

The Model



The Tasks [6]

1. Which vertex is the farthest (Eucl. dist.) neighbour of v ?
2. Do v and w have graph distance 2?

The Experience

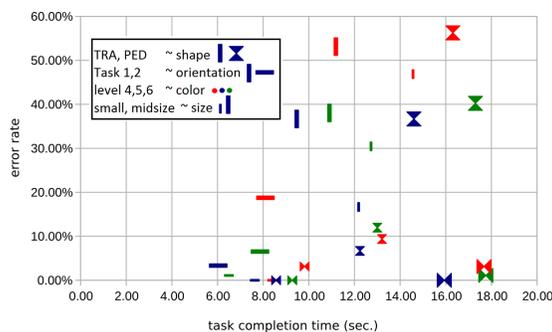
- 85 participants (19 - 62 years)
- classified by themselves → level 1 - 6.

The Variables

- level of experience $\in \{1, \dots, 6\}$ → controlled repeated-measures design (continue-on-demand)
- drawing model $\in \{PED, TRA\}$ → (2 models) \times (2 sizes) \times (2 repetitions) = 8 trials / task
- graph size $\in \{18, 25\}$ → randomly permuted 8 trials per task
- task $\in \{1, 2\}$ → stored task completion time and answer

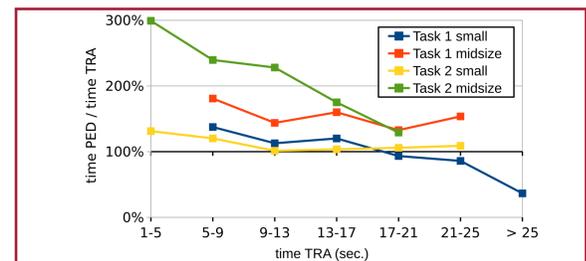
Results

Averaged error rates and completion times over repetitions and number of participant of level 4-6.

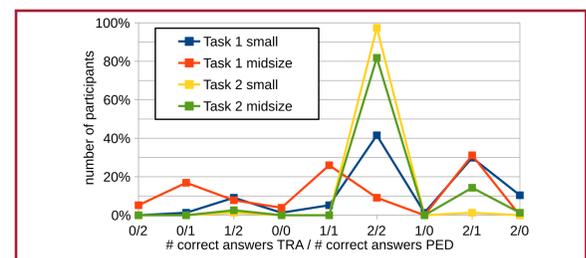


- \exists tendency to PED for small graphs in Task 1.
- Other results are not conclusive.

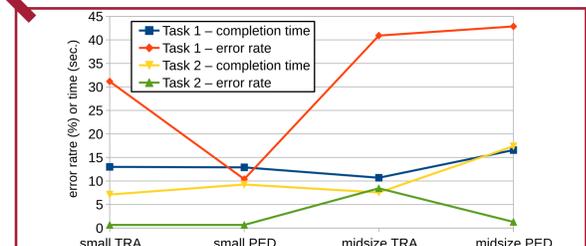
Relative Results (time)



Relative Results (error)



Overall Comparison



Discussion and Future Work

Discussion: small study size ⇒

- trust the accurate self classification of participants
- no "breaks" between two trials
- ⇒ used different graphs with comparable statistical properties, but did not prevented to accidentally pick a more difficult graph
- influences due to handling problems, distractions

from environment or no unifying screen resolution.

- participants might be used to TRA (a few trials of level 1 to 3 participants provide evidence)

Future Work:

- compare TRA layouts with layouts supporting 1/4-SHPEDs [4]
- with short "breaks" between serving graphs we may use the same graph in both models

- investigate other stub sizes and more tasks to uncover usefulness of PED w.r.t. specific requests

- investigate other graph sizes, in particular more dense graphs are of interest, since 1/4-SHPEDs support highly connected graphs

- to control the error rate further study should serve drawings for a fixed number of seconds

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