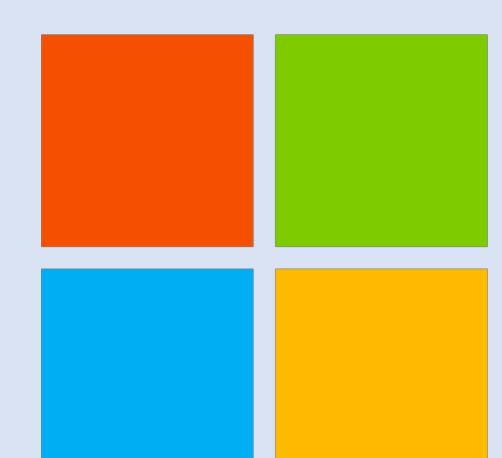


Do We Need Natural Language? Exploring Restricted Language Interfaces for Complex Domains



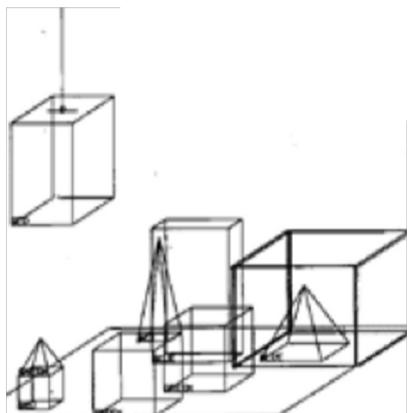
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A history

SHRDLU (Winograd, 1971)



Impressive, but not the best way to play with blocks!

Does the shortest thing the tallest block's support supports support anything green?



What?

Person: PICK UP A BIG RED BLOCK.

Computer: OK. (does it)

Person: FIND A BLOCK WHICH IS TALLER THAN THE ONE YOU ARE HOLDING AND PUT IT INTO THE BOX.

Computer: BY "IT", I ASSUME YOU MEAN THE BLOCK WHICH IS TALLER THAN THE ONE I AM HOLDING.

Person: DOES THE SHORTEST THING THE TALLEST PYRAMID'S SUPPORT SUPPORTS SUPPORT ANYTHING GREEN?

Computer: YES, THE GREEN PYRAMID.

Person: WHAT COLOR IS IT?

Computer: BY "IT", I ASSUME YOU MEAN THE SHORTEST THING THE TALLEST PYRAMID'S SUPPORT SUPPORTS.

Computer: RED

How natural should our natural language interfaces be?

Natural language is (Hendrix, Carbonell, Joshi, et al., 1982) flexible, easy to learn, faster than menus/GUIs, compositional

but is also ambiguous, verbose, repetitive

"Alexa, turn on the living room lights"
"Alexa, turn off the living room lights"
"Alexa, turn on the living room lights"
"Alexa, turn off the living room lights"

This could make natural language interfaces (NLIs) **less desirable**, despite pushes for fully-natural NLIs in many domains

NLyze (Excel)
Gulwani and Marron, 2014

	A	B	C
start			
goal			
tokens	add, remove, brown, orange, ...	remove the red blocks	↑↓
solved!			

"Sum the totalpay for chefs"

PixelTone (Photoshop)
Laput et al., 2013



"Change the color of the shirt"

Early NLIs with **controlled languages** (Perlman, 1984; Ogden and Bernick, 1996) developed partially due to computational limitations. Now that our models are better, are full NLIs still worth pursuing?

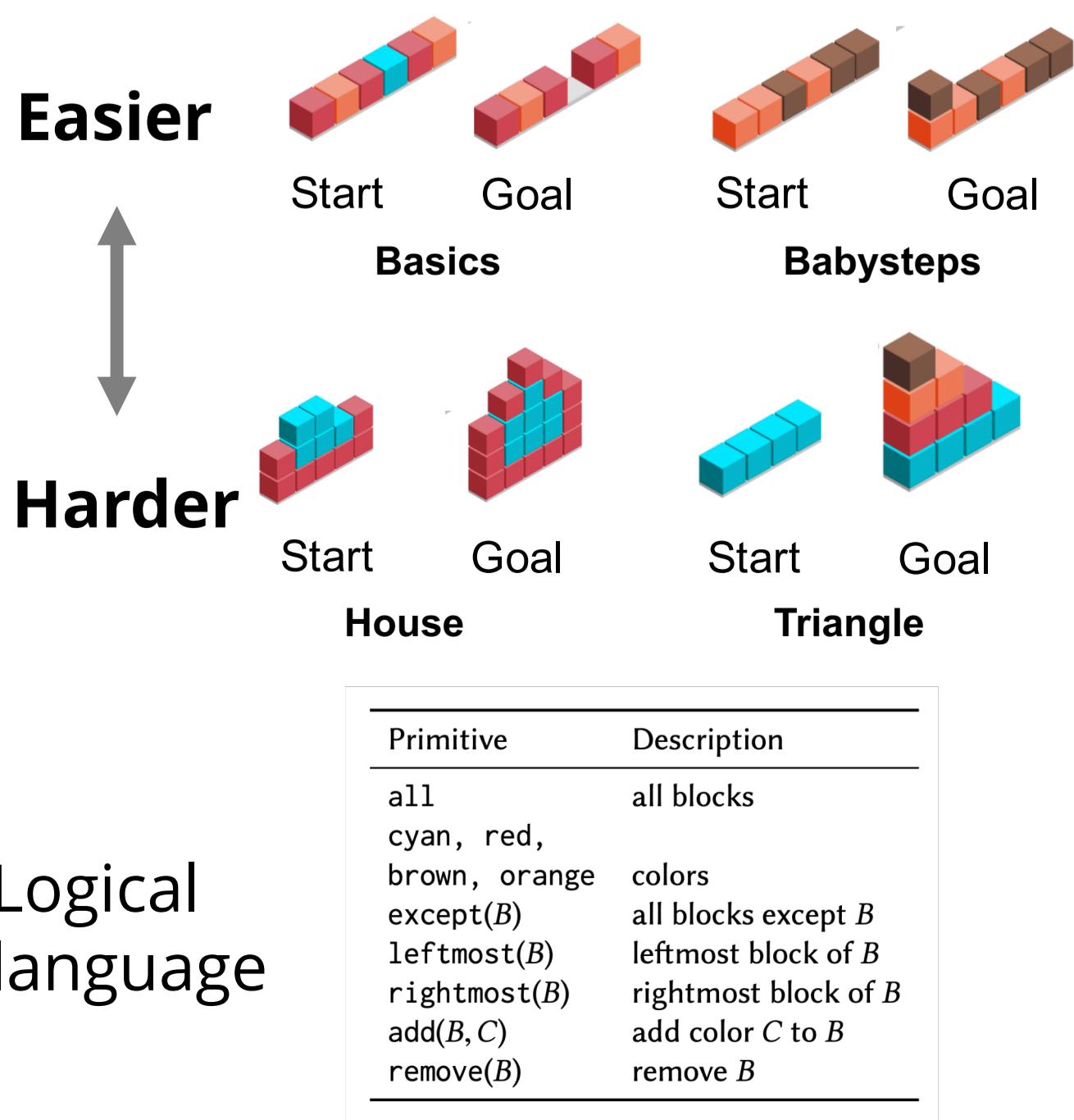
This work: can we *restrict* NLI languages without compromising UX and making NLI engineering easier?

Our game

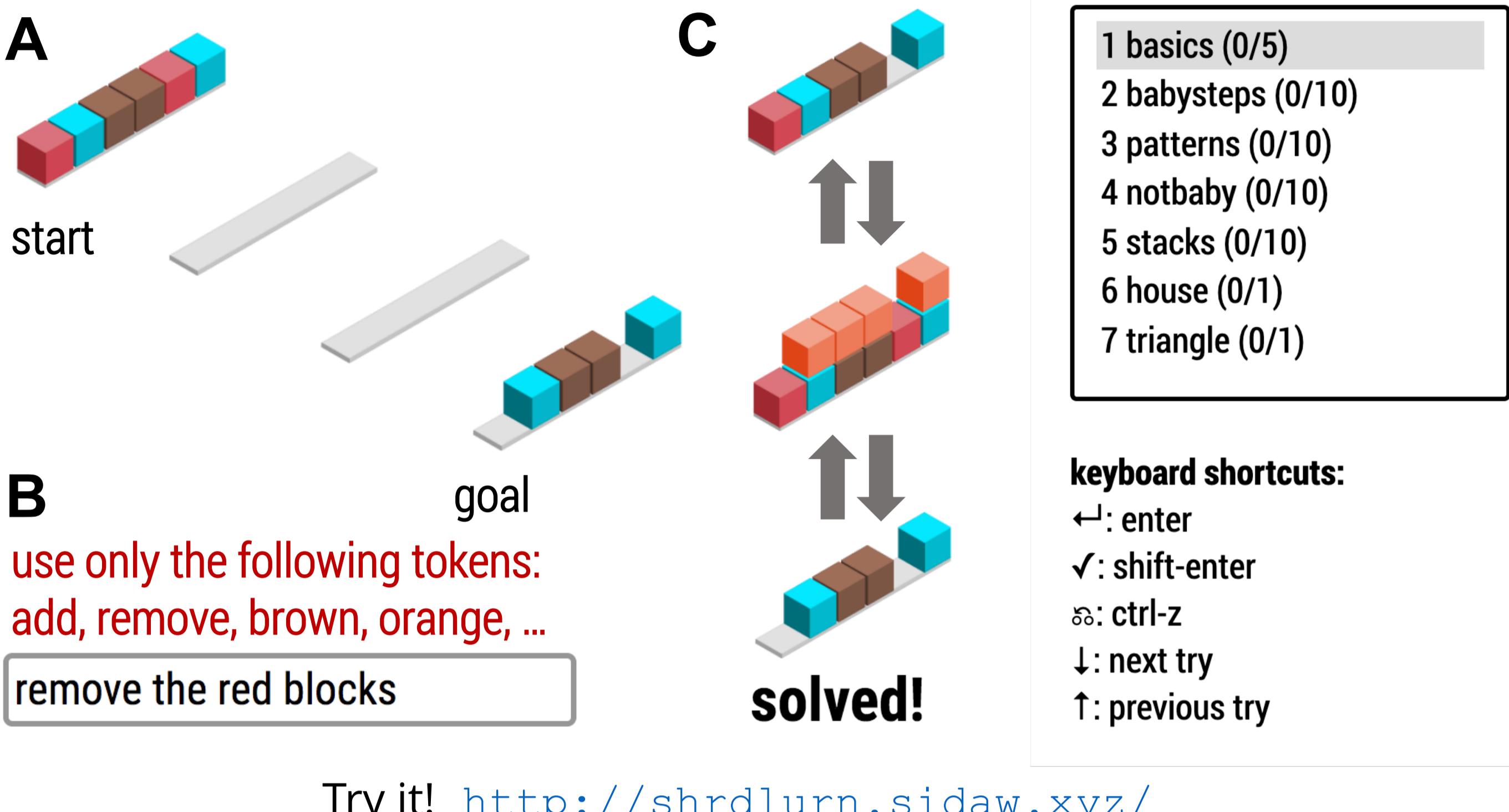
SHRDLURN (Wang et al., 2016)
Change blocks from **start** to **goal** position via language commands

Model: log-linear semantic parser over logical forms (e.g. **add(red, cyan)**, **remove(except(brown))**) given lexical features (bigrams, trigrams) + pragmatics

Computer learns from scratch with the user over 27 levels



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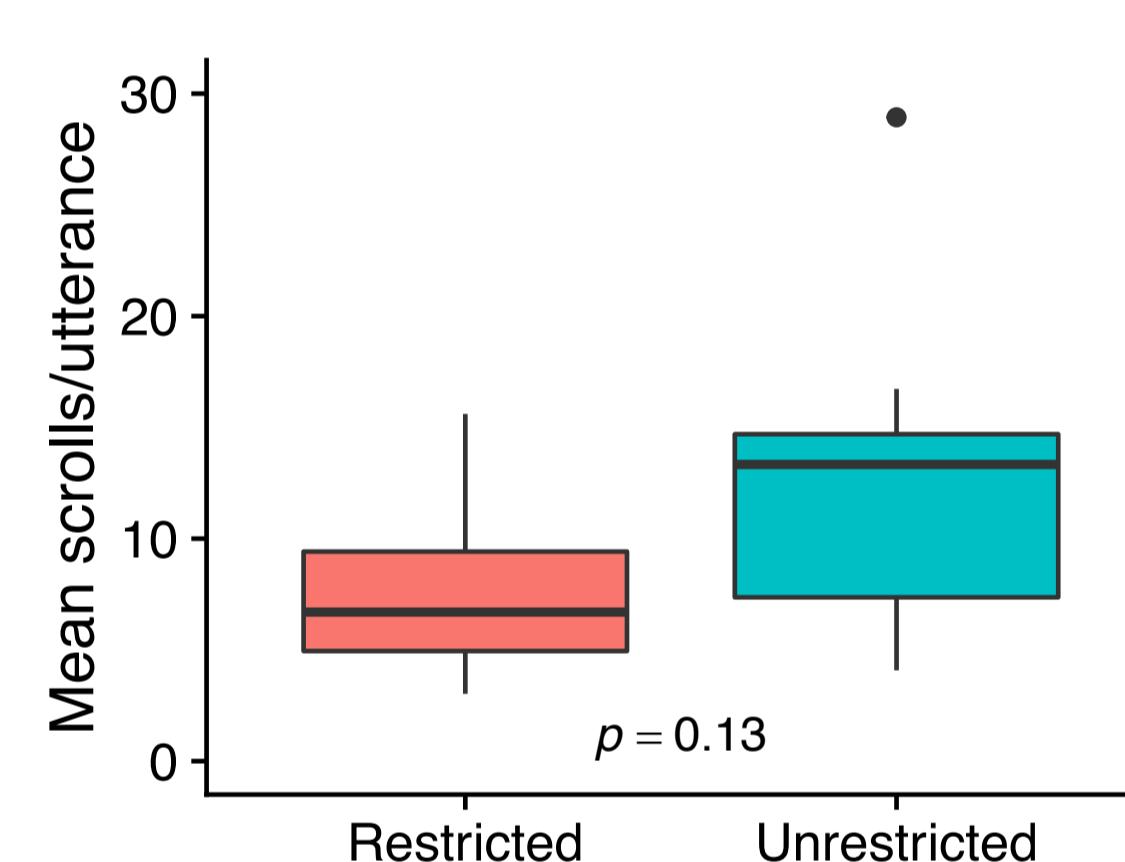


Experiment

16 participants, 2 conditions

- **Unrestricted** communication
- **Restricted** communication with only the following words:
all, cyan, red, brown, orange, except, leftmost, rightmost, add, remove, to
(corresponding to logical language)

Task performance (lower is better)



blue add orange
orange add rightmost
leftmost remove brown red
add all except cyan
the top first ones everything
blocks remove brown
above and bottom stack
stacks four blocks
leftmost block of three
leftmost block of four
leftmost block of five
leftmost block of six
leftmost block of seven
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