THE DATABASE

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trainingefs
efid
mgid

minigames
id
name

executivefunctions
id
name

sequencetypes
id
name

cbtttrials
trialnum
sessionnum
parid
stid
sequencelength
score
whencompleted

stopgoprogress
sessioncount
parid
currentlevel
completedoflevel
updated

wcstprogress
sessioncount
parid
currentlevel
completedoflevel
updated

cbttprogress
sessioncount
parid
currentlevel
completedoflevel
updated

cbttsessions
sessionnum
parid
sessionlength
correctcount
longestsequence
currentlevel
whencompleted

wcsttrials
trialnum
parid
sessionnum
rnum
trialcardid
ifsuccessful
RT
whencompleted

wcstruleblocks
ruleblocknum
sessionnum
parid
rid
phase
blocklength
adaptionrate

wcstsessions
sessionnum
parid
phaselength
card1
card2
card3
card4
p1accuracyrate
p1avgRT
p1adaptionrate
p2adaptionrate
p2avgRT
p2adaptionrate
bestRT
whencompleted

participants
id
name
address
age
diagnosis

wcsttrialcards
id
feature1
feature2
feature3

wcstruletypes
id
name

patienteffocus
parid
efid

stopgotrials
trialnum
sessionnum
parid
sgttid
startinterval
goRT
stopRT
ifsuccessful
stopsignaldelaytime
direction
whencompleted

stopgosessions
sessionnum
parid
sessionlength
correctcount
currentlevel
bestRT
avgGoRT
probsignalresponse
stopsignalRT
whencompleted

professional
id
name
clinic
phonenumber

protopatient
parid
proid

stopgotrialtypes
id
name

TRAINING EXECUTIVE FUNCTIONS

THE GAME
Focuses on training executive function deficits in those with ADHD where each cognitive-task based mini-game focuses on a particular executive function

Database's Purpose
Tracking individuals' performance over time in both training effectiveness and future ADHD treatment contexts

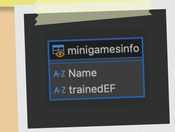
What It's Accomplishing
Saves vital measurements for each cognitive task from individual trials to overall sessions

Why the Database is Important
Able to view participant's long-term progress due to normalized data organization that drastically simplifies the query process for a variety of known and future queries, reduces data redundancy, and minimizes data modification errors

USER ACCESSIBILITY

How users can access the database to insert or retrieve data without concerning themselves with its inner workings

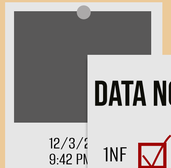
Simplified Views
Database views allowing for premade, simplified collections of data serving a particular purpose or answering a particular query



Simple view showing mini-games' titles and the executive function(s) they train

Google Sheets UI via Apps Script
Provides visualized progress tracking as the user enters a name/id and a variety of views populate tables and charts via a SQL query sent through an Apps Script function

Updating the Database
As participants complete sessions within the mini-games, http requests are sent with JSON-structured data to a Flask server which sends the SQL insert statement to the MySQL database



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DATA NORMALIZATION

1NF
- each cell contains one atomic value
- each table has a unique primary key

2NF
- attributes are dependent on the entire composite primary key

3NF
- no transitive dependency exists between non-key attributes

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Current Possible Queries Examples
- Has this participant improved in regards to a particular executive function training mini-game?
- How have they improved over all mini-games that train inhibition?
- Over all participants, what is the best score in the Stop Go mini-game?
- How did this participant perform in yesterday's session?

Many-to-Many
- participants -> professionals (protopatient)
- participants -> executivefunctions (patienteffocus)
- minigames -> executivefunctions (trainingefs)

LOGICAL RELATIONSHIPS EXAMPLES

One-to-One
- participants -> stopgoprogress
- wcstsessions -> wcsttrialcards

One-to-Many
- participants -> cbttsessions
- cbttsessions -> cbtttrials
- participants -> wcsttrials

DESIGN DECISIONS

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Separate game-related tables (ex: trials & sessions)

✓Allows for NOT NULL constraints for each game's performance measurements
✓Queries significantly faster as only searching through relevant data

All within a single table w/ game id (ex: 1 trials and 1 sessions table)

✗Minimal overlap between games, leaving many values null
✗Unable to use NOT NULL constraints
✗Queries search through irrelevant data when focused on one game

SCALABILITY/FLEXIBILITY

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Planning Ahead for Future Growth

- Separate game-related tables rather than having to alter existing, data-filled tables if a new mini-game is added
- Normalization of data allows for currently known and unforeseen queries

- While currently in experimentation phase, included real-world use case tables/columns to minimize later schema changes

Optimized Structure
- Data normalization - 3NF
- Composite keys
  - trials can be identified by their own number, overall session number, & the participant's id
- Separation of game-related data

Indexing
- Commonly searched non-key columns that are indexed drastically reduce query time
  - ex: participants' 'name'

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QUERY EFFICIENCY

DATA INTEGRITY & CONSTRAINTS

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- Ensures accuracy, consistency, and reliability through constraints such as NOT NULL and DEFAULT
- Many attributes constrained with NOT NULL as they're vital to performance tracking

- Foreign key constraints enforce valid relationships between tables & prevent invalid deletions of a parent
  - A participant may have data across all games referenced by its primary key as 'parid'

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