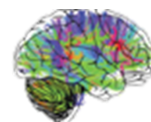


The Laboratory of Neurocognitive Development

Quarterly Newsletter: Winter 2025

Theme: *Goal Setting & Forming New Habits*



Scientist Spotlight

Meet Dr. Dan Petrie!

Dr. Petrie is a developmental cognitive neuroscientist studying how the brain learns and forms habits from childhood through adulthood. His work combines behavioral experiments with neuroimaging to understand how brain systems support learning and decision-making.

Outside the lab, he enjoys cooking fancy meals, spending time outdoors, and can rarely resist a hot cocoa or coffee at a cozy cafe!



What is the science saying?

As kids grow into teenagers and young adults, the way they make decisions starts to change. Early on, choices rely more on thinking things through carefully, but with age and experience, people begin to rely more on **habits: choices you make automatically because you've practiced them a lot.**

Our study looked at how habits develop and why they matter. We found that as young people get older, their brains, with the help of a chemical called **dopamine**, get better at forming habits and using them to guide behavior. This is helpful because it frees up mental energy for bigger challenges in the future.

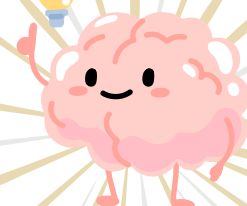
However, if habits get too strong, they can cause trouble. For example, automatically rushing through chores even when they require careful attention, or continuing an old routine at school even after the rules have changed. By understanding how kids and adults form habits, we can help people **practice good habits** and **change ones that don't work.**

Did you know that habit formation and goal-setting work together?

Goals provide the direction and motivation to create a roadmap on what you want to achieve.

Habits are small and consistent actions. It's best to perform them daily to move toward your goal.

Pro tip: Track and monitor your daily habits to stay motivated and see how small and consistent efforts contribute to larger goals.



Be a jolly scientist!

The science of Habits

Use **positive rewards** to start forming a new habit, like a piece of chocolate when you finish your homework on time!

Forming a habit takes **practice and repetition**– try to dedicate a month to the activity.

Habits help to automatize behavior, which is why you might not be aware of them. Stopping a bad habit can require **extra effort and support**.



Goal-Setting

Goal-setting is driven by a network of regions in our brain with the following players:

- **Prefrontal cortex** – helps us plan, evaluate, and make decisions about new goals (e.g., setting a game plan to finish a homework assignment).
- **Amygdala** – adds emotion to the goal. (e.g., the feeling of joy after completing your homework).
- **Hippocampus** – forms memories to the goal (e.g., now, you'll remember how it feels to finish your homework!).

These players work together to create the brain's reward system – typically driven by a neat brain chemical called dopamine!

By goal-setting, especially long-term goals, we can train our brain to improve planning and decision making! This strengthens brain pathways to help us become pros at what gives us passion!

Want to create your own goals?
Go to the Activity Page to start!

Holiday expeditions!

Skate with Santa at the UPMC Rink
PPG Place & Schenley Park Ice on
December 8, 15, 22 from 1 to 3 pm!

Enjoy Kwanzaa drumming at the
Holiday Community Day at the
August Wilson African American
Cultural Center on December 13 from
12 - 4 pm!

Celebrate the holiday spirit at the
Lawrenceville Cookie Tour between
Butler Street & Penn Avenue on
December 13, 14 from Noon to 5 pm!

From Our Team to You

Thank you so much for being part of our study!

Because of awesome participants like you, we're learning more about how kids and teens grow, think, and explore the world around them. Your time and ideas help us understand the brain in ways that make a real difference!



Scan the QR
code to check
out our website
and learn more!



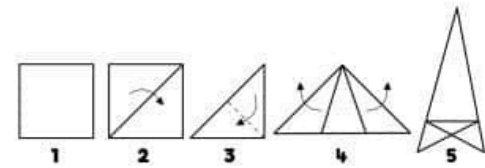
Step 1. Cut out the square template from this page

Step 2. Fold according to instructions (make sure you can see the dotted lines)

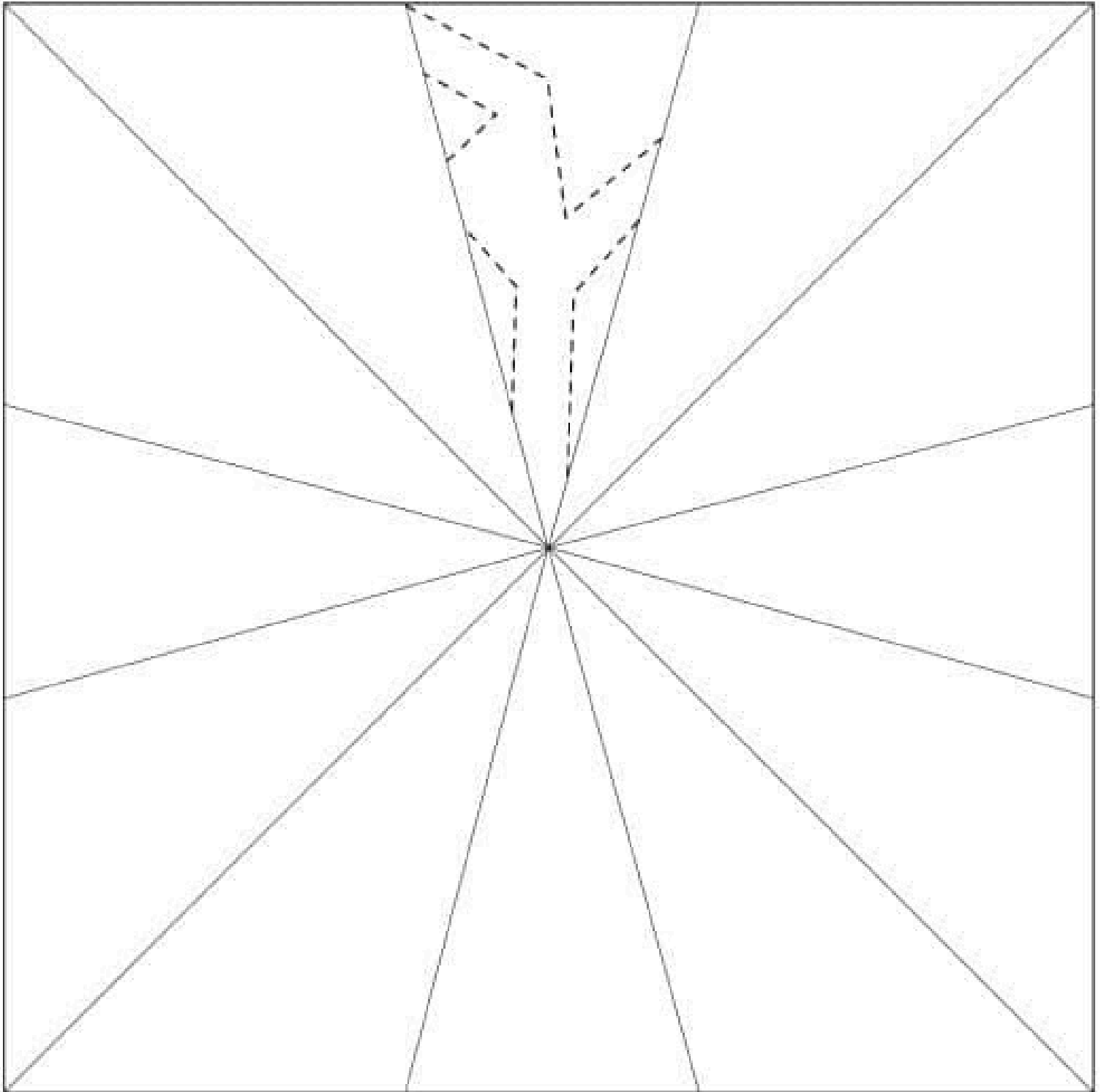
Step 3. Once folded, cut along the dotted lines

Step 4. Unfold and see your snowflake!

Paper Snowflake Template



Repeat with a new piece of paper and try cutting out different designs!



Bring your snowflakes the next time you come to our lab and we will hang them up!



What are your goals?



1 new thing I want to try:

1. _____

2 ways I want to serve others:

1. _____

2. _____

3 places I want to go:

1. _____

2. _____

3. _____

4 things I want to get better at:

1. _____

2. _____

3. _____

4. _____

5 things I want to learn:

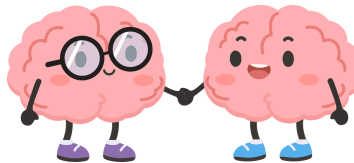
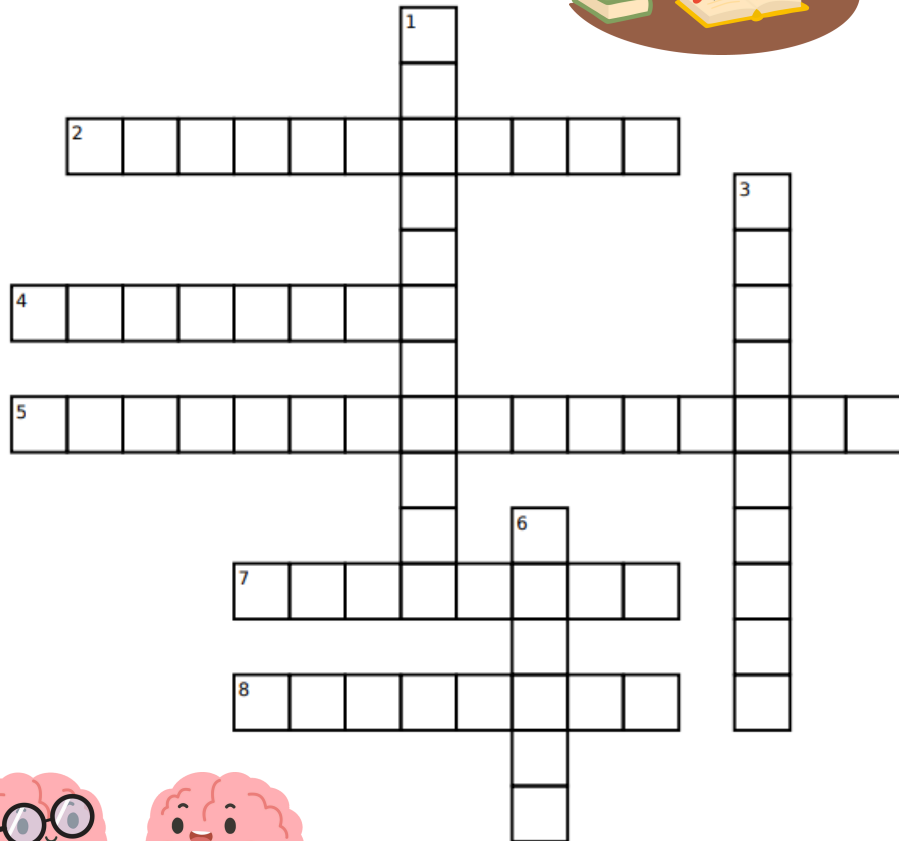
1. _____

2. _____

3. _____

4. _____

5. _____



Down:

1. a way to train your brain into improving planning and decision making
3. thing you need to do to form a habit
6. choices you make automatically because you have practiced them a lot

Across:

2. brain region that helps you form new memories
4. chemical that helps form new habits
5. brain region that helps form plans and make decisions
7. brain region that processes emotions
8. thing you need to do to form habit

Crossword answers:
Down: 1. goal setting 3. repetition 6. habits
Across: 2. hippocampus 4. dopamine 5. prefrontal cortex 7. amygdala 8. practice

You can find the answers to this crossword in the newsletter!

Read more about habits!

Hartley, C. A., & Somerville, L. H. (2015). The neuroscience of adolescent decision-making. *Current opinion in behavioral sciences*, 5, 108–115.

Graybiel, A. M., & Smith, K. S. (2014). Good habits, bad habits. *Scientific American*, 310(6), 38–43.

Smith, K. S., & Graybiel, A. M. (2016). Habit formation. *Dialogues in clinical neuroscience*, 18(1), 33–43.

Wood, W., & Rünger, D. (2016). Psychology of habit. *Annual review of psychology*, 67(1), 289–314.

Petrie, D. J., et al. (2025). Maturation of striatal dopamine supports the development of habitual behavior through adolescence. *bioRxiv*.