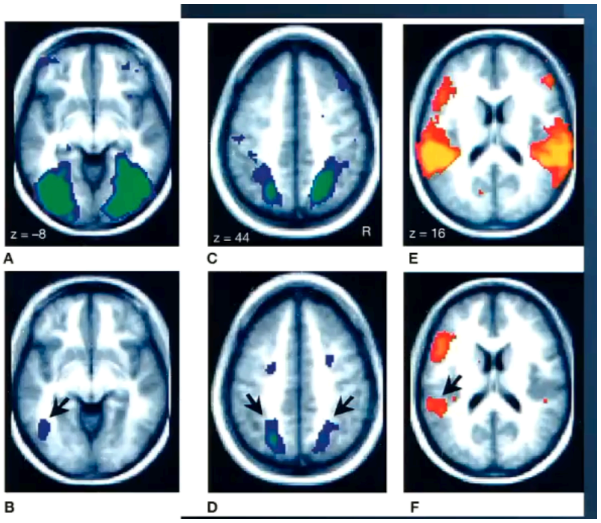
Chapter 7 - Memory Types (Memory 2)

- There are 2 main ways to retrieve information from memory - recall and recognition
  - **Recall:**
    - Formally defined as: Memory retrieval in which one must come up with the desired materials either in a response to a cue that names the context in which the materials were encountered or in response to a cue that broadly identifies sought out info or with no cues at all.
    - In other words, recall is the process of retrieving memories after being given a broad cue identifying the information sought.
    - A little more effortful/difficult.
    - Depends on both source memory and familiarity, although familiarity alone is usually insufficient for recall.
    - E.g. What was your 6th grade teacher like?
    - E.g. What are your thoughts on Elisabeth's criticisms of Descartes?
  - **Recognition**:
    - Formally defined as: Memory retrieval in which one must decide whether or not a piece of information was encountered previously or is accurate.
    - Depends on both familiarity and source memory, although moreso on familiarity.
    - E.g. Was your 6th grade teacher's name Aubrey?
    - E.g. Was Elisabeth critical of Descarte's views of dualistic metaphysics?
- **Learning as preparation for retrieval**
  - How information was learned impacts how it is later retrieved.
  - Learning connects new material with existing memories via retrieval pathways.
    - This is why it is easier to remember things which you have a lot of context for already compared to things which you have little context for — because there are more paths available to take to arrive at the desired material when recall is needed.
- **Context-dependent learning**
  - Formally defined as learning that is dependent on the state the learner is in during acquisition.
  - E.g. Learning while underwater, while on shrooms, while happy, all improve the ability to recall material under the same circumstances.
  - Learners encode context (psychological and physical->psychological) as well as the raw information of the material when forming memories.
    - The logic is that this helps with retrieval because you learn all these contextual cues, or pathway starters, to help trigger the memory retrieval or extend the retrieval process to the desired material.
    - **Evidence for the existence of context-dependent learning** comes from the diver experiment, which showed that participants learning underwater tended to test better underwater, and those learning on land tended to test better on land.
  - More of a psychological process than a physical process.
    - The process of using psychological or physical mechanisms to reinstate the context of the learning episode is known as **context reinstatement.**
      - **Evidence for the existence of psychological context reinstatement**: If you imagine the room where you learnt the information before walking into a different room where you take the test, this actually helps with test

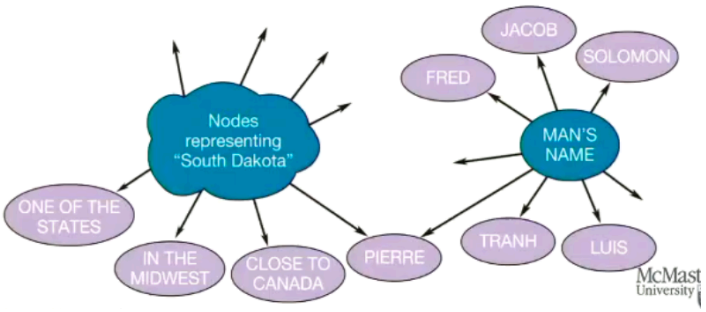
performance. In fact, the effect is nearly identical to just writing the test in the room you originally learnt!

- **Encoding specificity**:
  - Formally defined as remembering both the materials to be learned at the context of the learning.
  - Things are easier to recall because of the semantic congruency of the cue and the material.
    - **Evidence for semantic encoding specificity:** "The piano experiment"
      - Suppose participants are told either "The man lifted the piano" vs "The man painted the piano".
      - They are then given cues, one about weight and one about art.
      - The weight cue is more likely to induce the memory of the piano in participants that were told "The man lifted the piano" while the art cue is more likely to induce the memory of the piano in participants that were told "The man painted the piano".
  - 

  - **Neuroanatomical evidence for encoding specificity:** As you can see in the figure above, encoding (top slides) specific stimuli has a lot of neuroanatomical overlap with recalling the same stimuli! So in some sense, remembering is like re-experiencing the entire encoding episode again, including the context!
- **Encoding variability** = The idea that by learning in many different contexts, the distinctiveness of those contexts allows for better retrieval in any general situation (since more paths to the desired memory are being formed).

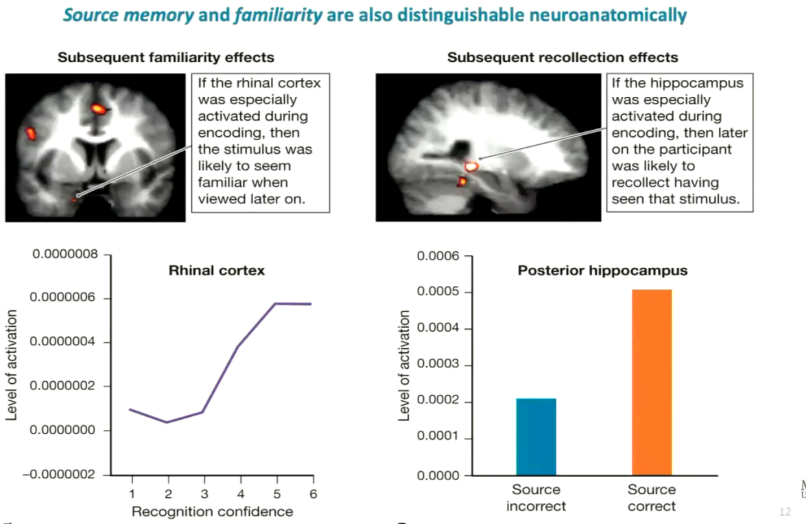
- **Memory Networks**
  - Memory can be thought of as a vast network of ideas, where ideas are represented as **nodes** connected to each other via **associative links**.
  - **Spreading activation** is the process by which activation travels from one node to another via associative links.
  - **Response thresholds** are the threshold at which the memory node fires, sending signals to its neighbors and drawing attention to itself.
    - Note that after firing, the activation level gradually decreases, so recently activated nodes will fire even on small inputs.
  - **Subthreshold activations** are activations that increase the activation level of a node, but do not exceed the response threshold.
  - **Summation** is the sum of all activations, subthreshold or otherwise.

- Explains the usefulness of hints.
  - E.g. You might have a hard time recalling “Ontario’s largest city by population”, since that cue only induces a subthreshold activation. But if you get the hint “Where Drake is from”, you might induce another subthreshold activation that puts the activation of “Toronto” above the response threshold, thereby triggering the response “Toronto”.
  - E.g:



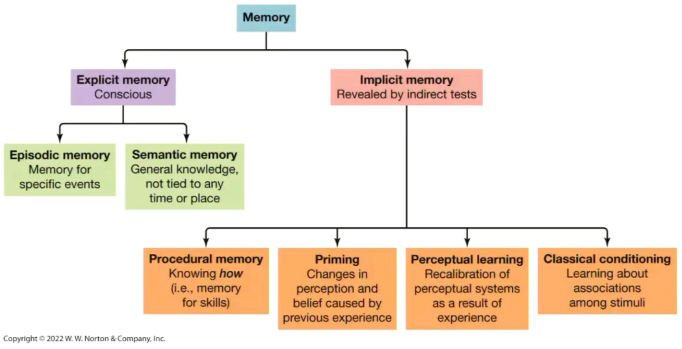
  - **Semantic priming**
    - Defined as the priming of a memory’s activation by activating semantically related ideas.
    - **Evidence for the existence of semantic priming:**
      - **Lexical decision tasks**
        - Suppose you ask participants to determine whether two words are both part of their language.
        - Some word pairs will be congruent (aka they “fit” together), like “‘Strawberry’, ‘Jam’”. Some will be incongruent, like “‘Strawberry’, ‘Lightbulb’”. Some will contain nonsense words, like “‘Strawberry’, ‘Hasd’”.
        - Participants will respond fastest to congruent pairs, then incongruent pairs, then pairs that contain nonsense words, implying that the words in congruent pairs semantically prime each other.
        - This is obviously dependent on the individual too - “Curry, Basketball” might be congruent for an NBA fan, but not for someone that has no general knowledge about basketball.
- **Memory Testing**
  - **Source memory** is defined as “a form of memory that enables a person to recollect the episode in which a particular stimulus/learning event was encountered”.
  - **Familiarity** is defined as “the feeling that one encountered the stimulus before or the influence of a past stimulus encounter on a present scenario, regardless of consciousness.” *It’s more complicated than this though.*
  - **Remember/know distinction**
    - Remembering/knowing distinction helps us distinguish between source memory and familiarity.
    - **Remembering stimulus encounters** means you can offer episodic and specific details about the encounter.
    - **Knowing stimulus encounters** means you have a sense of familiarity with the stimulus encounter.
- **Implicit vs Explicit Memory**

- **Implicit memory:** Remembering something without remembering how you remember it.



  - Above: fMRI scan during learning
  - If the hippocampus was particularly active during learning, then source memory is quite strong.
  - If the rhinal cortex was particularly active during learning, the familiarity is quite strong.
  - Combined: Strong rhinal cortex activation increased recognition confidence in participants, but source correctness in those same participants was actually correlated with hippocampal activity.
- **Examples of implicit memory**
  - Repetition priming: lexical decisions are faster if the word has been recently seen, even if participants have no recollection of the first exposure.
    - **Evidence — Word-stem completion tasks**: Participants are given a string like “CLA-”, and they are more likely to respond with words that they encoded in a different task, but forgot about.
- **Misattributing familiarity**
  - We are likely to misattribute the reason behind our familiarity with something**.**
  - **False fame effect:** Recognizing previously seen unfamous names and labelling them as famous.
    - **Evidence for the existence of the False Fame effect:**
      - Suppose you show a participant a bunch of fake names.
      - Well after they have forgotten the fake name experiment, show them a bunch of new names, some famous, some non-famous, and some from the fake name list.
      - Upon seeing the fake names in the new list, they are more likely to think that the fake names are famous.
        - This is because they are familiar with the name, but they have forgotten the source of memory, so they deduce the reason is “fame”.
  - **Illusion of truth**: Claims that are familiar end up seeming more valid due to the effect of implicit memory.
    - E.g. If we see something over and over again, we often will forget where we learnt the information from, and just assume the information is generally true.
    - This highlights the dangers of scrolling through social media for “education”.

    - **Source confusion**: The idea that you are more susceptible to suggestions about the source of an information if you feel that the information is familiar.
        - E.g. Suppose my friend and I saw some guy that we met at the library last year.
            - Me: “Have we met this dude before?”
            - Friend: “We played basketball with him a few years ago!”
            - Me: “Yeah that sounds about right.”
- **What is familiarity, really?**
    - **Processing pathway**
        - Defined as the sequence of detectors and connections between detectors that lead to the recognition or remembrance of a stimulus/idea.
        - Use of a pathway increases the pathways **processing fluency**, aka, the speed and ease with which pathways carry activations.
    - Changes in fluency or discrepancies between expected and experienced fluency can trigger the attribution process.
        - In this sense, familiarity is essentially a conclusion that you draw after processing a stimulus.
            - Prior encounter with stimulus -> Processing of stimulus faster -> Fluency increase detected -> You register stimulus as special -> You attempt to attribute why the stimulus feels special
- **Memory type hierarchy**



    - Memories are either explicit or implicit.
        - **Explicit**
            - Episodic (specific events)
            - Semantic (General knowledge not tied to any time or place)
        - **Implicit** (often revealed by indirect tests)
            - Procedural (how, i.e. memory for skills)
            - Priming (Changes in perceptions and beliefs caused by previous experience)
            - Perceptual learning (Recalibration of perceptual systems as a result of experience)
            - Classical conditioning (Learning associations among stimuli)
- **Amnesia**
    - Amnesia cases suggest the existence of distinct memory types.
    - Amnesia provides evidence for numerous things, like the difference between episodic and semantic memory, or the differences between implicit and explicit memory.
    - **Retrograde amnesia:** Memories prior to the amnesic event are disrupted.
    - **Anterograde amnesia:** Memories after the amnesic event are disrupted.

- **Episodic amnesia:** Memories of details of events are disrupted.
  - E.g. Clive can't remember his wedding, anniversary, etc. but he can remember general details like his love for his wife or that he enjoys composing music.
- **Semantic amnesia:** Memories of meaning of events are disrupted.
  - Often caused by encephalitis to temporal lobes.
  - E.g. Sally can remember her wedding, graduation, etc. but can't remember common words, famous people or fundamental traits of animate/inanimate objects.
- **Implicit memory impairment**:
  - Often due to damage in the amygdala.
  - **Evidence for implicit impairment without explicit impairment:**
    - Boat-light experiment
      - Patient with amygdala damage but an undamaged hippocampus was shown bright light, then a loud horn.
      - When shown bright light again, the patient could recall that the bright light was the source of stress, but the patient didn't actually elicit a fear response.
- **Explicit memory impairment:**
  - Often due to damage in the hippocampus.
  - E.g. Korsakoff patients: Often can recall things when tested indirectly, but not directly.
  - **Evidence for explicit impairment without implicit impairment**:
    - Needle experiment:
      - Korsakoff patient shakes experimenter's hand, which is holding a needle. This hurts the patient.
      - The next day, the experimenter tries to shake the patient's hand again.
      - She freaks out and says no, but not because she remembers the experimenter shaking her hand and it hurting explicitly, but because she's familiar with the concept of "don't shake experimenter's hands".
    - Boat-light experiment:
      - Patient with hippocampal damage but an undamaged amygdala was shown bright light, then a loud horn.
      - When shown bright light again, the patient had a fear response to the light, but couldn't tell why.

- **Optimal Learning**
  - Ideal form of learning depends on how the memories will later be used or retrieved.
  - The optimal learning strategy is to use multiple perspectives, so that you encode the materials in different ways and so that there are more retrieval pathways to said material.