**Mood-Congruent Memory Bias**

**Bias Definition**

Mood-congruent memory bias is a cognitive bias that affects how we recall past events. This bias occurs when our current mood influences the way we remember information, leading us to recall memories that are consistent with our current mood more easily than those that are not. For instance, if you're feeling happy, you're more likely to remember positive events, while if you're feeling sad, you're more likely to recall negative or sad events. This bias can impact both the recall of personal memories and the interpretation of events, potentially reinforcing our current mood by selectively recalling mood-consistent memories.

**Ten scenarios of Mood-Congruent Memory Bias**

1. **Sunny Day Optimism:** On a bright and sunny day, Chris feels unusually optimistic and decides to apply for a dream job. Chris focuses on recalling all the successful moments in his career, ignoring instances of rejection or failure, due to the mood-congruent bias where the positive mood makes positive memories more accessible.
2. **Rainy Day Reflections:** On a gloomy, rainy day, Ava feels down and starts thinking about past events where things didn't go well. Her mood leads her to remember more negative or challenging times in her life, affecting her current sense of well-being and making her day seem worse.
3. **Celebration Highlights:** At her anniversary party, Sophia feels incredibly happy and loved. This joyful mood helps her vividly recall other wonderful moments from her relationship, reinforcing her positive feelings and making the celebration even more meaningful.
4. **Stressful Reminders:** Under intense stress during a project deadline, Tom starts remembering other stressful situations where he felt overwhelmed. This recollection exacerbates his current stress, making it harder to focus on the task at hand.
5. **Melancholy Melodies:** Listening to a sad song, Mia begins to recall past heartbreaks and losses. The sad music induces a melancholic mood, which in turn makes memories of similar emotions more accessible and intense, deepening her sadness.
6. **Joyful Journeys:** While planning a vacation, Kevin feels excited and starts remembering all the fantastic trips he had before. His positive anticipation brings up more joyful travel memories, increasing his excitement about the upcoming journey.
7. **Anxious Anticipation:** Before a medical procedure, Lisa feels anxious and starts recalling other times she felt scared about health issues. Her anxiety makes these worrying memories more prominent, increasing her fear and apprehension about the appointment.
8. **Festive Recollections:** During the holiday season, Emma feels festive and joyful, leading her to reminisce about previous holidays and all the fun and warmth they brought. This mood makes those happy holiday memories even more vivid and enjoyable.
9. **Lonely Reflections:** Feeling lonely one evening, Derek starts thinking about other times he felt isolated or abandoned. His current loneliness brings these similar past experiences to mind, making his feelings of solitude even more profound.
10. **Euphoric Success:** After winning a prestigious award, Rachel feels euphoric and recalls many past successes and achievements. This victorious mood enhances her memory of similar triumphs, boosting her confidence and happiness further.

**User Story for the scenario "Anxious Anticipation"**

On a quiet morning, Lisa, overwhelmed by anxiety, realizes her medical procedure is just a day away. With each tick of the clock, her heart races as memories of past health scares flood her mind. Sitting in her dimly lit room, she feels the weight of her worries growing, each thought darker than the last.

Hesitantly, she reaches for her medical reports, her hands trembling as she reads through them. The clinical language and cold facts do little to comfort her; instead, they bring back vivid memories of times when her health faltered, increasing her dread for the upcoming procedure.

Attempting to distract herself, Lisa tries to focus on positive outcomes, but the anxiety has made her recall only the negative experiences. She remembers the long recovery after her last surgery, the discomfort of treatments, and the isolation of hospital stays. These worrying memories make her current fear even more intense, casting a shadow over her ability to stay optimistic.

As the day progresses, Lisa's room feels colder, and the silence louder. She knows she should reach out to someone—perhaps a friend or a counselor—but the anxiety makes it hard to find the words or the will. Instead, she curls up on her sofa, wrapped in a blanket, trying to find a semblance of peace in old books and movies that once brought her joy.

Finally, as night falls, Lisa decides to write down her fears in her journal, hoping to externalize some of the anxiety. With each word, she feels a slight release but knows the true test will come in the morning, at the hospital. She falls asleep with a mix of dread and a faint hope that maybe, just as stories can have unexpected positive turns, her procedure might go better than her anxious mind anticipates.

**Competency questions**

**Classes and properties**

Version of Ontology builder from Chat GPT

Classes:

1. **Person:** An individual experiencing mood-congruent memory bias.
2. **Mood:** Different states of emotion that a person can experience.
   * **Positive Mood:** A state of happiness or optimism.
   * **Negative Mood:** A state of sadness or pessimism.
3. **Memory:** Recollections from the past that can be influenced by the current mood.

* **Positive Memory:** Memories that evoke positive emotions.
* **Negative Memory:** Memories that evoke negative emotions.

1. **Event:** Specific occurrences that can trigger memories.
2. **Action:** Activities undertaken by a person, often influenced by mood-congruent memory.
3. **Outcome:** The result of actions influenced by mood-congruent memories.

Properties:

1. **hasMood** (domain: Person, range: Mood)
   * Links a Person to their current Mood.
2. **recalls** (domain: Person, range: Memory)
   * Connects a Person to a Memory they recall, influenced by their current mood.
3. **triggeredBy** (domain: Memory, range: Event)
   * Associates a Memory with an Event that can trigger it.
4. **undertakesAction** (domain: Person, range: Action)
   * Links a Person to an Action they decide to take.
5. **resultsIn** (domain: Action, range: Outcome)
   * Connects an Action to its Outcome.
6. **isInfluencedBy** (domain: Union{Action, Memory}, range: Mood)
   * Shows how an Action or Memory is influenced by Mood.

Our Changes

Classes:

1. **BiasedAgent**

* Represents an entity that experiences the bias.

1. **CognitiveBias** 
   * A general class representing cognitive biases.
2. **MoodCongruentMemory** 
   * A specific cognitive bias where our current mood influences the way we remember information, leading us to recall memories that are consistent with our current mood more easily than those that are not.

Properties:

1. **affectedBy** (domain: BiasedAgent, range:MoodCongruentMemory)
   * + indicates the influence of the cognitive bias to the individual whose perception and memory are influenced by.

**Framester Frames**

We used these frames for the classes’ alignment:

* **People** (<https://w3id.org/framester/data/framestercore/People>)

This frame contains general words for Individuals, i.e. humans. The Person is conceived of as independent of other specific individuals with whom they have relationships and independent of their participation in any particular activity. They may have an Age, Descriptor, Origin, Persistent\_characteristic, or Ethnicity. A man from Phoenix was shot yesterday. She gave birth to a screaming baby yesterday. I study 16-year-old female adolescents. I am dating an African-American man. She comforted the terrified child. I always thought of him as a stupid man.

Here is used to denote a human being and express that we are talking about human cognitive biases.

cbi:BiasedAgent => classification:isClassifiedBy=>fs:People

* + **Event** (<https://w3id.org/framester/data/framestercore/Event>)

An Event takes place at a Place and Time. Big earthquakes only happen along plate boundaries. INI The party will take place on Sunday in the all-you-can-eat buffet.

We used this frame to model any possible event in general on the abstract level.

fs:Event => reaction:hasConsequence => rsctx:EmotionalState

fs:Event => participation:hasParticipant => cbi:BiasedAgent

* + **RememberingExperience** (<http://etna.istc.cnr.it/framester2/data/framestercore/RememberingExperience>)

A Cognizer calls up an episodic memory of past Experience or an Impression of a Salient\_entity formed on the basis of past experience. The Cognizer may also remember the Salient\_entity in a particular State, which serves as a frame of reference in the Cognizer's mind. When attention is focused on a Salient\_entity, then mention of a global Experience is excluded and typically, but not always, either a State or Impression of the Salient\_entity is presented. Episodic memory is the explicit memory of events. It includes time, place, and associated emotions (which affect the quality of the memorization).

This frame we used to capture the result of remembering activity.

cbi:BiasedAgent=> exob:isEngagedIn => fs:RememberingExperience

fs:RememberingExperience => actspec:hasPrecondition => rsctx:EmotionalState

fs:RememberingExperience => crm:hasType => predifined string (‘happy’, ‘sad’, etc)

**Ontology Design Patterns**

We used this pattern to model the bias.

* **Classification** (<http://ontologydesignpatterns.org/wiki/Submissions:Classification>)

To represent the relations between concepts (roles, task, parameters) and entities (person, events, values), which concepts can be assigned to. To formalize the application (e.g. tagging) of informal knowledge organization systems such as lexica, thesauri, subject directories, folksonomies, etc., where concepts are first-order elements.

* **Experience and Observation** (<http://ontologydesignpatterns.org/wiki/Submissions:Experience_%26_Observation>)

To represent the epistemological "missing link" between a cognitive activity, e.g. the interaction with a cultural object, and any evidence of the effects this activity has on the individuals that are engaged with it; what can collectively be considered as an experience.

* **Reaction** (<http://ontologydesignpatterns.org/wiki/Submissions:Reaction>)

To model dynamic situations, tracking agents and actions they produce, events that are results of some action(s), and consequences as new actions, i.e. reactions.

* + **ActivitySpecification** (<http://ontologydesignpatterns.org/wiki/Submissions:ActivitySpecification>) This work is concerned with supporting a correct and meaningful representation of activities on the Semantic Web, with the potential to support tasks such as activity recognition and reasoning about causation. This requires an ontology capable of more than simply documenting and annotating individual activity occurrences; definitions of activity specifications are required.
  + **Participation** (<http://ontologydesignpatterns.org/wiki/Submissions:Participation>)

To represent participation of an object in an event.

* + **Object with states** (<http://ontologydesignpatterns.org/wiki/Submissions:Object_with_states>)

An object can have different states for which different restrictions apply. The goal of the pattern is to allow modelling the different states of an object and the restrictions on such object for its different states.

**Entities and properties from other resources**

**Recommender System Context ontology**

* + **rsctx:EmotionalState** (<https://softeng.polito.it/rsctx/#d4e1858>)

The state of a person's emotions (especially with regard to pleasure or dejection).

**CIDOC Conceptual Reference Model**

* **crm:has type (is type of)** (domain: EmotionalState, range: predefined string like "happy", "sad", etc)

(<https://cidoc-crm.org/html/cidoc_crm_v7.1.3.html#P2>)

This property allows sub-typing of entities – a form of specialization – through the use of a terminological hierarchy, or thesaurus.

**Bibliography**

Faul, Leonard, Kevin S. LaBar, «Mood-congruent memory revisited.», *Psychological Review*, vol. 130, fasc. 6, novembre 2023, pp. 1421–1456.

Latgé-Tovar, Sofia, «Mood-congruent memory in healthy adults: A systematic review», Psic. Clin., Rio de Janeiro, vol. 34, n. 3, p. 621 – 659, set-dez/2022, s.d.