The Nature of Intrinsic Motivation and How to Support It

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Intrinsic Motivation

• The inherent desire to seek out novelty and challenge, to explore and investigate, and to stretch and extend one’s capacities.
Intrinsic Motivation

A naturally-occurring tendency toward…

• **Exploration**—discovering something new.
• **Spontaneous Interest**—learning something new.
• **Environmental Mastery**
  - Extending existing capacities
  - Developing new capacities
Intrinsic Motivation

These pursuits produce subjective feelings (interest-enjoyment, a sense of satisfaction) that encourage volitional present and future engagement in that task, activity, or environment.

Spontaneous Satisfactions

- Satisfaction from a job well done
- Satisfaction for personal causation (self-as-cause)
- “It was fun—I enjoyed it.”
- “It was interesting.”
- “I liked it.”

INTRINSIC REWARDS to encourage present and future volitional engagement in that activity or environment.
Intrinsic Motivation

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Spontaneous Satisfactions

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• “It was fun—I enjoyed it.”
• “It was interesting.”

Thus, intrinsic motivation is the desire to seek out novelty and explore, and to seek out and master optimal challenge for no reason other than the resulting feelings of interest and enjoyment.
Intrinsic Motivation

Alternative Definition

• The motivation that arises from experiences of psychological need satisfaction (autonomy, competence, and relatedness).
Psychological Need

• An inherent (inborn) psychological process that underlies the proactive desire to seek out interactions with the environment that promote personal growth, social development, and psychological well-being.

• **Autonomy**—the need to experience self-direction and personal endorsement in the initiation and regulation of behavior (goals)

• **Competence**—the need to be effective in interactions with the environment.

• **Relatedness**—the need establish close emotional connections and attachments with others.
What Is the Difference between Intrinsic Motivation & Psychological Need?

- **Intrinsic Motivation**: The inherent desire to seek out novelty and challenge, to explore and investigate, and to stretch and extend one’s capacities.

- **Psychological Need**: An inherent (inborn) psychological process that underlies the proactive desire to seek out interactions with the environment that can promote personal growth, social development, and psychological well-being.
What Is the Difference between Intrinsic Motivation & Psychological Need?

• **Intrinsic Motivation**: The inherent desire to seek out novelty and challenge, to explore and investigate, and to stretch and extend one’s capacities.

• **Psychological Need**: An inherent (inborn) psychological process that underlies the proactive desire to seek out interactions with the environment that can promote personal growth, social development, and psychological well-being.

• Conceptually, motivationally, behaviorally, and neurally (neuroscience)—*They are essentially the same thing.*

*If you are studying one, you are also studying the other, though the psychological needs are the larger construct, because they underlie additional processes (e.g., internalization, integration).*
Self-Determination Theorists

• An activity is fun (intrinsically motivating) because it generates experiences of feeling autonomous, competent, and related. For instance, playing a game of tennis is an intrinsically motivated activity because it allows one to feel free and volitional, challenged and effective, and interpersonally close and connected to others. If playing tennis does not generate these feelings (i.e., forced to play, not being able to make the ball go where you want it to go, being criticized and devalued by one’s coach), then it simply will not be much fun. So, it is not tennis per se that is fun but, rather, it is the experiences of autonomy, competence, and relatedness need satisfaction. Intrinsic motivation is quite literally the motivation that arises from experiences of psychological need satisfaction.

Critics

• C’mon; psychological needs? How do you know people have psychological needs? You are just making up an explanatory construct. It is just not scientific to use a construct for which you do have clear, concrete evidence.
Our Brain-Based Research Plan

• It it is real, then a psychological need should be in the brain (nervous system). If it is inherent, then it should be present at birth and in all people, regardless of age, race, SES, gender, etc.

• Let’s take experimental activities that have been previously validated to activate intrinsic motivation and psychological needs while people lay in an fMRI scanner and observe their brain activity during that need activation/satisfaction experience.

• The question: Can you find clear evidence of intrinsic motivational processes in the brain?
Our First Study

Imagine Doing the Same Activity for One of Three Reasons—IM, EM, Neutral

Table 1  Examples of phrases for each experimental condition used in the experimental task

<table>
<thead>
<tr>
<th>IM phrases</th>
<th>EM phrases</th>
<th>Neutral phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing an enjoyable paper</td>
<td>Writing an extra-credit paper</td>
<td>Writing a class paper</td>
</tr>
<tr>
<td>Working with freedom</td>
<td>Working for incentives</td>
<td>Working with time to spare</td>
</tr>
<tr>
<td>Participating in a fun project</td>
<td>Participating in a money-making project</td>
<td>Participating in a routine project</td>
</tr>
<tr>
<td>Having options and choices</td>
<td>Having prizes and awards</td>
<td>Having things to do</td>
</tr>
<tr>
<td>Studying for fun</td>
<td>Studying for a grade</td>
<td>Studying because it is time</td>
</tr>
<tr>
<td>Feeling curious</td>
<td>Feeling rewarded</td>
<td>Feeling neutral</td>
</tr>
<tr>
<td>Feeling interested</td>
<td>Anticipating a prize</td>
<td>Feeling normal</td>
</tr>
</tbody>
</table>
Unique to Intrinsic Motivation: Anterior Insular Cortex Activity

The greater the person’s self-reported need satisfaction, the greater their anterior insula cortex activity.
Where Is the Insular Cortex?
Our Second Experiment

**Anterior Insula**: Unique Brain Activity during Intrinsic Motivation

**Angular Gyrus**: Unique Brain Activity during Extrinsic Motivation

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**Fig. 4** There were significantly greater brain activations of the AIC in the IM condition than in the EM condition (A). The BOLD signal changes of the AIC across conditions are presented (B). Neu: neutral.

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**Fig. 5** There were significantly greater brain activations of the angular gyrus in the EM condition than in the IM condition (A). The BOLD signal changes of the angular gyrus across conditions are presented (B). Neu: neutral.
Bilateral Anterior Insula Activity Is
(1) Sensitive to Experimental Manipulations of IM
(2) Correlated with Need Satisfaction Self-Reports

Figure 2. Bilateral anterior insular cortex (AIC) associations with self-reported need satisfaction scores.
Can You Solve This Anagram?
I’ll Give You 7 Seconds…and a Hint
Can You Solve This Anagram?
I’ll Give You 7 Seconds…and a Hint

NRITA
Can You Solve This Anagram?
I’ll Give You 7 Seconds…and a Hint

NRITA

TR___
Did You Experience Competence Anticipation and Satisfaction?

• Encountering optimal challenge
• Having an opportunity to stretch and expand your skill
• Feeling enjoyment from being challenged
• Anticipating satisfaction from a job well done
• Actually experiencing mastery and effectance from making progress
• Developing greater capacity
Okay, One More…

CRPEI
Can You Solve This Anagram?
I’ll Give You 7 Seconds…and a Hint

CRPEI

PR____
# Experimental Task to Generate Competence Need Satisfaction

## Competence Enabling Anagrams vs. Non-Competence Enabling Anagrams

<table>
<thead>
<tr>
<th>Time Range</th>
<th>Competence Enabling Anagrams</th>
<th>Non-Competence Enabling Anagrams</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 secs.</td>
<td>OHTMN MO_ _ _ ?</td>
<td>CLCOK CL_ _ _ ?</td>
</tr>
<tr>
<td>3-4 secs.</td>
<td>CRPEI PR _ _ _ ?</td>
<td>WHTIE WH_ _ _ ?</td>
</tr>
<tr>
<td>5-7 sec.</td>
<td>NRITA TR _ _ _ ?</td>
<td>HAYPP HA_ _ _ ?</td>
</tr>
<tr>
<td></td>
<td>HUOCG CO_ _ _ ?</td>
<td>IFRST FI_ _ _ ?</td>
</tr>
<tr>
<td></td>
<td>SPEUA PA_ _ _ ?</td>
<td>THIKN TH_ _ _ ?</td>
</tr>
</tbody>
</table>

![Graph showing comparison between Challenge, Competence satisfaction, Interest, and Difficulty for COMP and NCOMP]
Did You Experience Competence Anticipation and Satisfaction?

- Encountering optimal challenge
- Having an opportunity to stretch and expand your skill
- Feeling enjoyment from being challenged
- Anticipating satisfaction from a job well done
- Actually experiencing mastery and effectance from making progress
- Developing greater capacity
Our Third Experiment
Anterior Insula Associated with Competence Satisfaction

Bilateral anterior insular activity was more observed during competence-enabling anagrams (COMP) than during non-competence-enabling anagrams (NCOMP).
During Competence Satisfaction, Anterior Insula and Striatum Activations Co-occur [According to Psychophysiological Interaction (PPI) Analysis]

Figure 3: AIC associations with VS activations.
Our Fourth Experiment

Autonomy need satisfaction was not experimentally manipulated, but assesses as a naturally-occurring extent of “want to”.

< National flag presentation >

Flag (2s) → Flag + Name (2s) → Autonomy rating (2s) → ISI (Mean=2s) → Question (4s) → Question + Answer (3s) → Interest rating (2s) → ITI (Mean=4s)

< National flag learning >

Lebanon → Lebanon → Lebanon → Cedar tree = __ → Cedar tree = Eternity → How interesting was it?
Our Fourth Experiment
Anterior Insula Associated with Autonomy Satisfaction

A

AIC (38, 4, 4)

B

**

Signal change (%)

0

-0.1

0.05

0.1

-0.05

0

-0.1

-0.15

Highly autonomous  Moderately autonomous  Non autonomous

$t = 10$
During Autonomy Satisfaction, Anterior Insula and DLPFC Activations Co-occur  
[According to Correlational Analyses]

DLPFC = Dorsolateral Prefrontal Cortex
Supporting Intrinsic Motivation

- Anterior Insular activations are the neural basis of both intrinsic motivation and psychological need satisfaction.

- Okay, how can we provide daily activities that activate the anterior insular cortex?

- I am going to use the example of a classroom context in which teachers try to support their students’ intrinsic motivation and psychological needs.
Involve Students’ Psychological Needs into the Learning Activity

**Involve Competence**

*Competence Defined:* The need to interact effectively with one’s surroundings (with learning activities, with educational challenges)

<table>
<thead>
<tr>
<th>Offer Optimal Challenge</th>
<th>Goal to Improve</th>
<th>Goal to Develop Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide Guidance</td>
<td>“How to” Demonstration</td>
<td>Provide Step-by-Step Help</td>
</tr>
</tbody>
</table>
Involve Students’ Psychological Needs into the Learning Activity

**Involve Autonomy**

*Autonomy Defined:* The need to be the origin of one’s behavior. The inner endorsement of one’s behavior. An experience of, “Yes, I want to do this.”

<table>
<thead>
<tr>
<th>What do you want?</th>
<th>What’s interesting?</th>
<th>Where should we start?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Offer choice

Encourage intrinsic goals
Involve Students’ Psychological Needs into the Learning Activity

**Involve Relatedness**

*Relatedness Defined:* The need to be involved in warm relationships characterized by acceptance, liking, and mutual concern.

<table>
<thead>
<tr>
<th>Work with a Partner</th>
<th>Work with a Group</th>
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<tbody>
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<td></td>
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</table>
## Use Instruction to Involve Students’ Psychological Needs for Autonomy, Competence, and Relatedness

<table>
<thead>
<tr>
<th>Support Autonomy</th>
<th>Support Competence</th>
<th>Support Relatedness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Autonomy Defined:</strong> The need to be the origin of one’s behavior. The inner endorsement of one’s behavior.</td>
<td><strong>Competence Defined:</strong> The need to interact effectively with one’s environmental surroundings.</td>
<td><strong>Relatedness Defined:</strong> The need to be involved in warm relationships characterized by acceptance and mutual concern.</td>
</tr>
<tr>
<td>- Offer students an opportunity for self-direction within the learning activity.</td>
<td>- When introducing a learning activity, offer students not only the learning activity but also a:</td>
<td>- When introducing a learning activity, allow students an opportunity for face-to-face social interaction, such as:</td>
</tr>
<tr>
<td>- When introducing a learning activity, allow students to approach that activity in a way that is consistent with their own personal interests, goals, wants, preferences, and priorities.</td>
<td>- Optimal challenge (Can you do it?)</td>
<td>- Pair students together</td>
</tr>
<tr>
<td>- When engagement originates from these inner motivational resources, students say “I want to do it…”</td>
<td>- Goal to strive for</td>
<td>- Invite students to share their work with each other</td>
</tr>
<tr>
<td>- I want to = an inner endorsement of behavior = autonomy.</td>
<td>- Standard of Excellence (“This is what excellence is”)</td>
<td>- Invite students to exchange their answers to a question</td>
</tr>
<tr>
<td></td>
<td>- The challenge is always “Try to improve; try to perform better than before.”</td>
<td>- Simply have them initiate a conversation—invite them to ask each other about their interests, activities, perspective, concerns, plans, and so forth.</td>
</tr>
<tr>
<td></td>
<td>- Everyone wants to be <strong>effective</strong></td>
<td>- Everyone wants to <strong>belong</strong>.</td>
</tr>
<tr>
<td></td>
<td>- Everyone wants to <strong>improve</strong></td>
<td>- Everyone want to be <strong>accepted</strong>.</td>
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Involve Students’ Psychological Needs
Offer Interesting Things to Do

Watch a Brief, Lesson-Relevant Video

Play a Game
(Turn a Review Session into a Fun Game)

5 Questions about Motivation (Sample Video)