

進化心理学における 感情と行動

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Overview

進化心理学者にとっての感情とは？

- 行動との関連が強調される
 - フィーリングは重視されない
- 例1
 - Tooby & CosmidesのInternal Regulatory Variables
- 例2
 - O'Connor (2016) の罪悪感の進化モデル

進化心理学者にとっての表情とは？

- シグナルとしての外適応
- シグナルの機能と感情そのものの機能

Tooby & Cosmides (2008)

in *Handbook of Emotions* (3rd ed.)

...the human mental architecture is crowded with evolved, functionally specialized programs. (p. 116)

But the existence of all these diverse programs itself creates an adaptive problem: Programs that are individually designed to solve specific adaptive problems could, if simultaneously activated, deliver outputs that conflict with one another, interfering with or nullifying each other's functional products. (p. 116)

In general, to behave functionally according to evolutionary standards, the mind's many subprograms need to be orchestrated so that their joint product at any given time is coordinated to deal with the adaptive challenge being faced, rather than operating in a self-defeating, discoordinated, and cacophonous fashion. We argue that such coordination is accomplished by a special class of programs: the **emotions** that evolved to solve these superordinate demands. (p. 117)

心的アーキテクチャ=領域固有の機能をもった
多くの心理メカニズムの集まり

領域固有のメカニズムが同時に複数活動する
と干渉し合う(非適応的な結果をもたらす)

領域固有のメカニズム同士のはたらきを調整
する心のはたらきが必要 ⇒ emotions

Tooby & Cosmides (2008)

in *Handbook of Emotions* (3rd ed.)

Fighting, falling in love, escaping predators, confronting sexual infidelity, experiencing a failure-driven loss in status, responding to the death of a family member, and so on each involved conditions, contingencies, situations, or event types that recurred innumerable times in hominid evolutionary history. Repeated encounters with each kind of situation selected for adaptations that guided information processing, behavior, and the body adaptively through the clusters of conditions, demands, and contingencies characterizing that particular class of situation. (p. 117)

Running away in terror, vomiting in disgust, or attacking in rage are bets that are placed because these responses had the highest average payoffs for our ancestors, given the eliciting conditions. (p. 117)

進化的適応環境 (EEA) で適応問題解決に
有効であった、状況に応じた情報処理・行動・
身体反応が導かれる

恐怖⇒逃走

嫌悪⇒嘔吐

怒り⇒攻撃

* The “environment of evolutionary adaptedness” (EEA) is not a place or a habitat, or even a time period. Rather, it is a statistical composite of the adaptation-relevant properties of the ancestral environments encountered by members of ancestral populations, weighted by their frequency and fitness-consequences. (Tooby & Cosmides, 1990, *Ethol Sociobiol*, pp. 386-387)

Herbert Simon's (1967 *Psych Rev*) Interruption Theory

Psychological Review
1967, Vol. 74, No. 1, 29-39

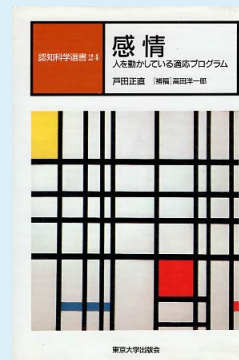
MOTIVATIONAL AND EMOTIONAL CONTROLS
OF COGNITION¹

HERBERT A. SIMON

Serial information-processingに必要な2つのメカニズム

- **Goal-terminating mechanisms**
 - aspiration achievement
 - Satisficing (満足化)
 - impatience (時間切れ)
 - discouragement (可能なサブルーチンすべてが失敗)
- **Interruption mechanism** (noticing and interrupting) allows the processor to respond to urgent needs in real time (**emotion**)

⇔ 戸田のアージ理論 (今ここ原理)



Scarantino's (2024) Motivational Theory

... emotion programs have evolved by natural selection or by cultural selection. In both cases, the core idea is that organisms face problems of such importance that **selective pressures** are generated for finding a **special-purpose solution** that **outperforms** any **solution that general-purpose capacities could provide**. (p. 456)

Fundamental problems on an evolutionary time scale

- removing a source of obstruction (**anger***)
- avoiding dangers (**fear***)
- avoiding contamination from pathogens (**disgust***)
- repairing intimate relationships damaged by some harm done (**guilt***)
- reinforcing reciprocity and group cohesion among non-kin (**gratitude***)
- promoting social distancing from targets appraised as threatening to group identity (**contempt***)

The use of * is meant to emphasize that there is no perfect overlap between the folk psychological categories of anger, fear, disgust, and so on and the programs selected to resolve these fundamental evolutionary problems.

Emotion Theory:
The Routledge Comprehensive Guide
Volume I: History, Contemporary Theories, and Key Elements

Nico Fridja's (2016 *Cogn Emot*) Evolutionary theory

COGNITION AND EMOTION, 2016
Vol. 30, No. 4, 609–620, <http://dx.doi.org/10.1080/02699931.2016.1145106>

 Routledge
Taylor & Francis Group

The evolutionary emergence of what we call “emotions”[‡]

Nico H. Frijda[†]

Four bases of emotions

- **Action Readiness**—“readiness to find and execute some action that can do something with or about the event and its affective value” (p. 614). Outcome expectations “mostly remain non-conscious” (p. 614)
- **Strivings**—“motivate to marshal required resources, and to select and execute appropriate actions” (p. 615)
- **Intention**—“consciousness enables us to form explicit plans, and mutually agreed plans, as well as expectations that we can think about, and also discuss with others” (p. 616)
- **Feelings**—“contents of conscious awareness” (p. 617). “Many people use the term ‘emotions’ for this sense” (p. 617)

T&C
Simon
Scarantino

進化心理学的な感情理解の特徴

感情 (emotions) = 状況への適応的反応を促す心理メカニズム

個別の感情には独立した個別の機能

- 情報処理、行動、レディネス等、“行動を伴う反応”と関連

主観的な経験 (feeling) は重視されない

15 Internal Regulatory Variables and the Design of Human Motivation: A Computational and Evolutionary Approach

John Tooby, Leda Cosmides, Aaron Sell, Debra Lieberman, and Daniel Sznycer

Internal Regulatory Variable

(Tooby et al., 2008 *Handbook of Approach and Avoidance Motivation*)

...some motivational systems are designed to produce felt experiences as a result of having processed an internal regulatory variable, and those felt experiences guide behavior in a direct and adaptive fashion. The [suffocation alarm system](#) is a familiar example. There is an internal regulatory variable that registers [carbon dioxide to oxygen levels in circulation](#). When this ratio increases too quickly, the suffocation alarm system is triggered. It [downregulates motivations to pursue ongoing activities](#) (e.g., we stop reading under the covers), [upregulates motivations to change position](#), and produces the felt experience of suffocation. (p. 255)

Suffocation Alarm Systemの場合

血中の二酸化炭素濃度・酸素濃度をモニターするinternal regulatory variable

血中二酸化炭素濃度が上昇すると

- ・現在進行中の活動を抑制
- ・酸素を取り入れる行動を促進
- ・窒息の主観的経験を生じさせる

CHAPTER 8



The Evolutionary Psychology of the Emotions and Their Relationship to Internal Regulatory Variables



感情と結びついた Internal Regulatory Variable

Kinship index—特定の相手との血縁度

- 母親が弟妹の世話をしているところを見たかどうか、幼少期にきょうだいと同じ家で過ごした期間等に規定される

Welfare Tradeoff Ratio—特定の相手の福利を重視する程度

- 特定の相手への利他行動（相手のために自分自身の福利を犠牲にする行動）を動機づける

Sexual Value—特定の相手の性的パートナーとしての価値

* Kinship indexは、WTR・SVへの入力にもなる



感情とInternal Regulatory Variable: Recalibration

Recalibrational Releasing Engines (含 affective recalibration) による internal regulatory variable の更新

- 自身を傷つけた相手に対する怒り
 - 相手に対するWTRを下げる
 - 怒りを示すことで相手から自分に対するWTRを上昇させることができるかもしれない
- 自身が傷つけた相手に対する罪悪感
 - 自身が相手のWTRを過小評価しすぎていたと気づくときに罪悪感が生起
 - 相手に対するWTRを上げる
- 自身に利益を与えた相手に対する感謝
 - 相手が自分を重視している程度を過小評価していたと気づくときに感謝が生起
 - 相手に対するWTRを上げる

進化ゲーム理論という視点 感情と行動（戦略）の結びつき

The Evolution of Guilt:
A Model-Based Approach

Cailin O'Connor*†

Using evolutionary game theory, I consider how guilt can provide individual fitness benefits to actors both before and after bad behavior. This supplements recent work by philosophers on the evolution of guilt with a more complete picture of the relevant selection pressures.

O'Connor (2016 *Philos Sci*) の罪悪感の進化モデル

- ① ...the anticipation of experiencing guilt can influence actors' choices as to whether to commit a transgression. Empirical work demonstrates that guilt proneness in humans decreases the likelihood of social transgression. (p. 898)
- ② ...the actual experience of guilt after committing a transgression can lead to confession and to reparative behaviors like apology, gift giving, acceptance of punishment, and self-punishment. (p. 898)

Using evolutionary game theory, I consider how guilt can provide individual fitness benefits to actors both before and after bad behavior. This supplements recent work by philosophers on the evolution of guilt with a more complete picture of the relevant selection pressures.

TABLE 1. PAYOFF FOR THE
PRISONER'S DILEMMA

	Player 2	
	Cooperate	Defect
Player 1:		
Cooperate	2,2	0,3
Defect	3,0	1,1

感情の進化心理学的理解

感情全般の機能

- 感情は“非合理的”なものではないという視点の転換
- 行動の調性（非適応的な反応を抑制し、適応的な反応を促進する）

個々の感情の機能は個別に説明

- 個人内の最適化モデル
- 進化ゲーム理論による相互作用のモデル化

感情は適応的である ÷ 感情は適応的な行動と結びついている

- 行動が主・感情は従（想定される行動とのむすびつきが重要）

表情の進化心理学的理解

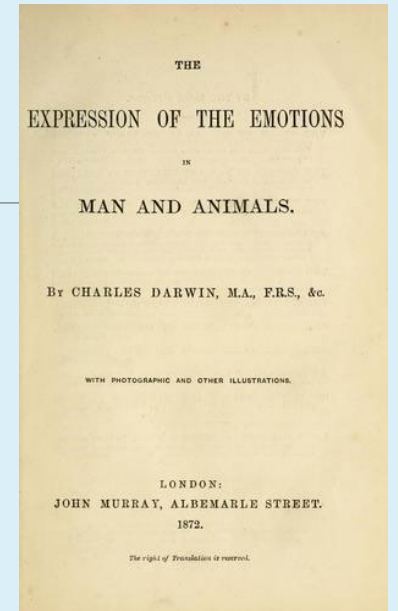
Darwin (1872) の表情研究

- *The Expression of the Emotions in Man and Animals*

Ekmanらの基本感情研究

- 文化を越えて認識される固有の表情をもつ“基本感情”

Lisa Feldman Barrettらによる基本感情批判



外適応としての表情の進化

感情のそもそもの機能と結びついた表情

他者に感情状態を伝えることに適応的な意味があるときにシグナルとして進化

- 感情そのものの機能 \neq シグナルの機能

- (例) 恐怖と恐怖表情

- 恐怖感情の機能

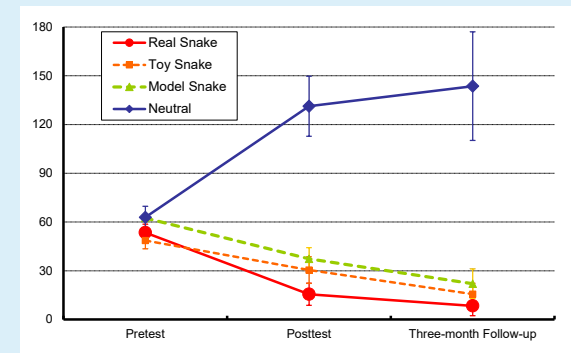
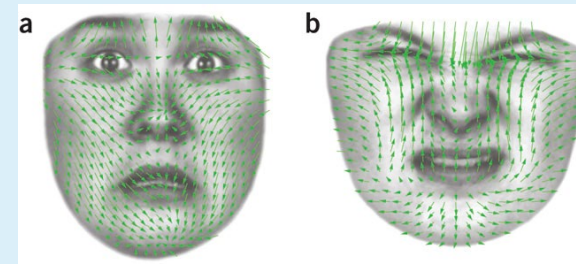
- 恐怖刺激からの逃避・回避

(e.g., Susskind et al., 2008 *Nat Neurosci*)

- 恐怖表情の機能 (もしシグナルならば)

- 他個体に危険の存在を知らせる

(e.g., Mineka et al., 1984 *J Abnorm Psychol*)



表情の進化＝シグナルの進化

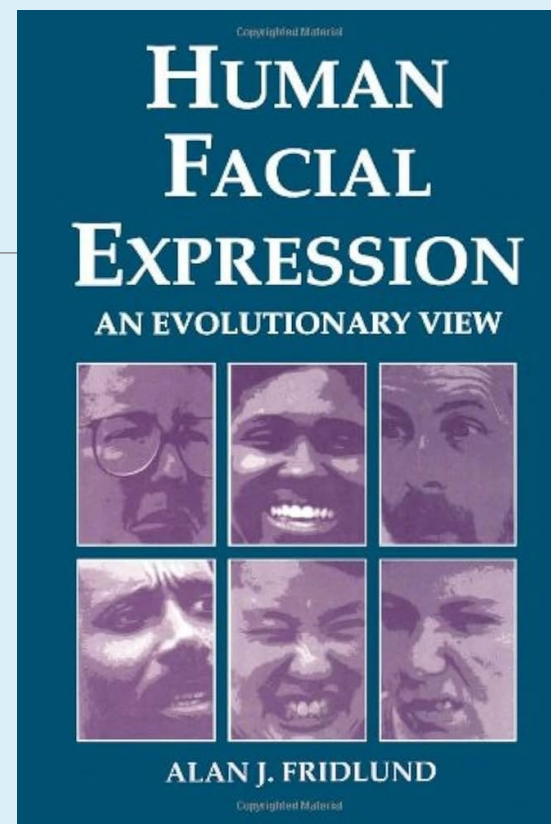
感情本来の機能とシグナルとしての機能は別

シグナルの機能

- 表出者だけがもつ情報を受信者に伝える

シグナリング・ゲームによるモデル化

- シグナルの発信者（表情の表出者）と受信者の両者に情報共有のメリットがあるときに発信する傾向・受信する傾向が共進化する
- 親子であればヘビの恐怖を教えることで子供の生存率が高まる（親子双方にメリットがある）



Emotion Expressions: On Signals, Symbols, and Spandrels—A Response to Barrett (2011)

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aps
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http://cdps.sagepub.com
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Summary

感情と進化心理学

- 適応的行動との関連の重視／主観的フィーリングは重視されない
 - “自然”を相手にした場合—行動の最適化のモデル
 - 他個体を相手にした場合—進化ゲーム理論
- 行動（選択）により利得（適応度）が決まるので行動が主
- 感情の役割は行動（選択）を動機づけるメカニズム

表情と進化心理学

- 表情の機能はシグナル ≠ 感情の本来の機能とは別