

A Neuromarketing Analysis of the Impact of Financial Predation on Victims

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Abstract: Recent literature has argued that financial experts act as predators as soon as given a chance. Bernard Madoff is one example among many whereby a financial expert has occupied the top level of a financial web and has devised a plan to take advantage of his clients for his own benefit, causing them financial harm, by surprise.

The model currently in use in the area of financial predation, named the Mesly model, states that perceived predation influences trust and cooperation between a financial predator and his clients. This multidisciplinary paper examines the neurobiological mechanisms supporting such model. Indeed, finding the neurobiological basis for the model of financial predation may allow regulators to better understand how financial predators work, hence the possibility to devise better safeguard measures to protect naive investors.

Key words: perceived predation; Mesly model; financial predators, neurobiological.

Introduction

Financial predators are part of our everyday life, perhaps without most people realizing it. Yet, white-collar crime has been discussed for many years (Szwajkowski, 1985) and a number of financial crises have occurred over the last decades (Rajan, 2010). Some authors have noticed that many of these crises are caused by factors such as lack of risk assessment on the part of financial institutions (Hellwig, 2009), but it can also be argued that customers who suffered from the 2008 housing collapse have unconsciously trapped themselves in what became known as predatory mortgages.

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The Mesly model stipulates there is an inherent driving force in all humans, that of predatory behavior (Mesly, 2009 to 2012). Financial experts do not escape such deeply rooted motivation and will deploy strategies to enrich themselves at the expense of their clients turned prey. Examples range from Nick Leeson at Barings in Singapore to Vincent Lacroix with his company Norbourg in Canada. Yet, “There is a scarcity of information concerning the emotional aspects of financial management” in general (Shapiro and Bruchell, 2012, p. 92).

The present multidisciplinary paper is organized as follows. First, the main model of financial predation (the Mesly model) is reviewed. We then examine some of the neurobiological facts that can help explain this model, which has proven to be valid time and again over the course of five years of research involving 19 groups tested in all kinds of different settings (car dealerships, banks, orchestra, etc.). The hypothalamus is identified as the predatory core and a look at its multiple functions is provided (annex A). The hypothalamus is a complex yet tiny body structure (the size of a pea), which is part of the diencephalon (which also includes the thalamus and limbic structures – Purves *et al.*, 2004). Indeed, “Almost every major subdivision of the neuraxis, or central nervous system (CNS) communicates with the hypothalamus and is subject to its influence.” (Squire *et al.*, 2003, p. 897).

Second, findings from a short investigation on a real case of financial predation that took place in Québec, Eastern Canada in the years 2000 are discussed and summarized.

Section three discusses the impact of financial predation over the victims based on the above-mentioned self-reported study and data is evaluated with respect to the original model of financial predation and its up-graded, neurobiological version.

The paper finishes by suggesting an experiment that would involve the use of *fMRI* to support or disconfirm its main hypotheses. Indeed, *fMRI* could reveal intimate brain functioning that could allow to detecting financial predators, thus providing a tool to disarm them before they cause harm.

The Theory of Financial Predation

The theory of financial predation was developed following extensive studies showing that investors in all walks of life tend to be on the defensive in many situations, with the (sometimes hidden) fears of being abused by the trading or financial *vis-à-vis* (the person he is dealing with – expression mostly used in dyadic encounters).

A sales person or a financial broker can, after all, take advantage of a potential client/investor by developing strategies to lure him, with the net result that he thus serves his own benefit, causing the client a financial loss, *by surprise*.

In most cases, a financial broker maintains an image of self-control and nurtures trust with his clients so as to minimize the perceived risk associated with any transactions, as perceived predation would likely bring sales potential down (Bergeron and Laroche, 2009). A high perceived risk with little chance of financial rewards will scare away, paralyze, or slow down a potential investor who would otherwise be willing to invest his hard-earned money. Of note, perceived predation does not equate with the concept of Machiavellianism (Christie and Geis, 1970), which is seldom discussed in marketing literature, or that of opportunism presented by Williamson (1981). Machiavellians show distrust in others and exhibit less emotional and general intelligence than the average people (Verbeke *et al.*, 2011), as opposed to financial gurus who outsmart regulatory authorities and long-time clients alike. Furthermore, predation relies on (blind) trust and not on contracts as in Williamson's theory of opportunism; a contract is a substitute for trust in specific contexts (rarely used in the case of interpersonal consumer-seller relationships). Financial crooks are, however, like Machiavellians: they are "sneaky", self-serving, and on the look-out to cheat... but more than that, they also act by surprise.

Hypothalamus and marketing theory

Marketing theory uses physiology, sociology and economics as sources of inspiration for a large number of its tenets. There is thus a justification to dig further into the marketing vision of human individual and group behaviors. From the perspective of perceived predation, the hypothalamus is the key.

All mammals have a hypothalamus – it is one of the most ancient brain structures of animal life. The hypothalamus is involved in the body's visceral and most fundamental, specie-surviving activities: 1) blood flow (cardiac, renal

function etc.); 2) energy metabolism (body temperature, food, water, sleep); 3) reproductive functions (sex, pregnancy, lactation); and 4) responses to threats (stress hormones, sympathetic-parasympathetic tone, etc.). This relates well with psychological and marketing theory through Maslow's pyramid of needs (e.g. physiological needs).

It can therefore be said that predation takes buyers and sellers "by the guts"; it is rooted deeply inside the most basic part of the brain, the hypothalamus.

Perceived predation

Of great importance in the theory of financial predation is the concept of *perceived predation*, a concept that is used in the ecology literature (e.g. Johnsson, Rydeborg and Sundström, 2004, p. 390).

Perceived predation is the fact of interpreting and feeling that the *vis-à-vis* is there "to get you", that his intentions are destructive. It is of course highly based on perception, that is, first on information that comes from the five senses but also from fast, quasi-instinctive interpretations an individual makes by judging the behaviors of his *vis-à-vis*. Poitras, Stimec, and Roberge (2010) point out to the way people engaged in conflict resolution (e.g. a couple) *perceive* a lawyer: they think in particular that he (1) is not fundamentally motivated towards conflict resolution; (2) favors the billing of hours rather than genuinely prompting resolution to the current conflict; and (3) fights over issues that have little relevance, thus generating unnecessary costs.

Predation

Predation, as opposed to *perceived* predation, has been defined as the actual act of taking advantage of someone else's vulnerability, by surprise (Mesly 2010 to 2012). Predation revolves around trust as trust is the acceptance of putting oneself in a position of vulnerability while attributing positive intentions towards the *vis-à-vis* (Bell, Oppenheimer and Bastien, 2002; Riedl and Javor, 2012).

Both perceived predation and actual acts of predation cause stress, which travels from the brain to the body through the hypothalamic-pituitary-adrenal axis.

axis (HPA). There is a well-established relationship between stress (elevated cortisol levels) and increased risk cancer or depression for both humans and animals (Bowles, 2000). In a study on stress, it was found that 73% of mice that were submitted to electric shocks but which could not escape (escape being a natural response provided by the hypothalamus) developed tumors. On the other hand, 37% of mice that could escape did not suffer such health problems (Pelletier, 1993). The link between health condition and the ability of the hypothalamus to exercise its functions, including its response system in the presence of danger, seems obvious.

The Mesly model of financial predation

The theory of financial predation is based on the following simplified model (figure 1)

Fig. 1 – The Mesly model of financial predation (simplified)

Of note, all three processes -- trust/attachment/emotion; cooperation/socialization/conation and equilibrium/rationalization/cognition participate in some way in aggression and rage (Siegel and Sapru, 2011, p. 449).

According to this model, perceived predation influences trust negatively (*I-*). As Mayer, Davis and Schoorman (1995, p. 712) explain, trust is intimately linked to vulnerability (and predation is taking advantage of someone else's vulnerability).

Whilst it is possible to achieve cooperation without trust being present (one may be obliged to cooperate within a group project); productive collaborative efforts are generally built on the basis of trust, which develops over time (*T*).

Trust involves some form of attachment (Bowlby, 1973), facilitated by the release of oxytocin, which has been found, among other functions, to play a role in the nurturing of mothers towards their infants. Oxytocin originates from the hypothalamus' paraventricular and supraoptic nuclei and is released by the

posterior pituitary gland¹ (Siegel and Sapru, 2011, p. 215). Oxytocin may explain unconditional trust (activated in the septal area of the brain, in direct link with the hypothalamus and which plays a key role in financial predation – see article by Mesly *et al.* 2012b) and conditional trust (activated by the tegmental-ventral area of the hypothalamus).

Indeed, the hypothalamus' dorsomedial and ventromedial nuclei have been found to be involved in “feeding, reproductive and *parenting*² behavior...” (Purves *at al.*, 2004, p. 486). The hypothalamus is also involved in behaviors that go against the establishment of trust: “...the medial hypothalamus ...provides a mechanism that modulates feeding, generates affective processes, such as rage behavior³, in animal and people...” (Siegel and Sapru, 2011, p. 215).

Cooperation is affected by stress. In animal studies, research has shown that stress caused by the presence of predators tend to diminish the ability of rats to cooperate; hence perceived predation is assumed to have an effect (an indirect one in the original Mesly model) on cooperation (Rosebloom *et al.*, 2007). Stress, of course, leads to the production of cortisol through the aforementioned HPA axis.

Equilibrium is a measure of cognitive efforts made by each individual in the dyad aimed at determining whether the relationship is equitable, whether a sense of win-win prevails. The current Mesly model stipulates that cooperation exerts a causative effect (*C*) on atmosphere: efficient cooperation necessarily leads to a sound interactional atmosphere between the parties (buyer and seller) but poor cooperation necessarily leads to a venomous atmosphere the likes of conflict or rupture. This atmosphere is a marketing concept that forms a loop back to perceived predation over time (*t*).

Time is to be taken into account (*e.g.* in the building of trust) and again, the hypothalamus plays a vital role: “A principal function of the hypothalamus is to impose temporal organization on hormonal and behavioral processes by virtue of the timekeeping properties of the biological clock in the rostral hypothalamus” (Squire *et al.*, 2003, p. 901).

¹ Unlike all other brain areas (except for the third ventricle and the cerebral aqueduct which are *not* bi-dimensional), the pituitary gland does not have a left and right side but rather anterior and posterior structures.

² Author's italics.

³ Rage is a defensive mechanism associated with the ventromedial nucleus of the anterior-posterior hypothalamus. The present study points to rage as still being experienced by the victims six years after the class action was filed.

In order to justify more fully the Mesly model, it is worth looking at the efferent and afferent connections (Siegel and Sapru, 2011) from and to the hypothalamus, which has been identified at the centre of predatory behavior in this paper (See table 1):

Table 1 - Efferent from (11) and Afferent to (9) the hypothalamus

As can be seen, the only way for the hypothalamus to get a feedback on the internal state of the body is by going through a complete loop (which was part of the original Mesly model – see Figure 1, arrow labelled (*t*)): there are no connections *from* the pituitary gland *to* the hypothalamus so that the HPA axis is unidirectional; additionally, the tegmentum feeds information on homeostasis to the hypothalamus (but the hypothalamus has no efferent connections to the tegmentum).

Some of the main brains molecules and brain structures involved in the Mesly model of financial predation are as follows (Table 2):

Table 2 – A preliminary view at the brain

What unites all of these sections is fear (perceived predation): the hypothalamus responds to fear through quasi-instantaneous fight or flight response, while the prefrontal cortex, the amygdala and social activities (e.g. animals emitting warning signals in the presence of incoming predators to alert other members of the group) are all mobilized in the presence of fear (perceived predation).

The study

To test whether the Mesly model of financial predation makes sense beyond the neurobiological evidence, we decided to run an exploratory analysis. We retrieved the names of clients who had been defrauded in one of the major fraud such case in Eastern Canada and who had filed a class action against the firm that emptied their pockets through financial dealings turned sour. Equipped

with this list of some 1500 names, we traced them through Internet search engines to verify that the addresses indicated on the class action document were still valid – the class action had been entered in 2006 and was still under court proceedings.

We then sent the Mesly questionnaire (Mesly, 2010) to the participants we could reach, some 900 of them. The questionnaire had been amended to include self-reporting questions about the effects on their being a victim of fraud on their health and social life in particular.

Of the 900 letters that were sent out, only a mere 26 came back. Of those, only 3 were from people who had lost less than C\$ 100,000, the rest having lost more than that amount. This alone seemed to suggest that the victims did not bother replying if they deemed it unnecessary given the amount of money they lost. Nevertheless, follow-up phone calls were made for the people who had not returned the questionnaires. In a few cases, the address was erroneous and the people could no longer be traced. Finally, others just didn't want to "bother".

This study took place between February and April 2012 and we decided not to insist to get filled-out questionnaire from people who had not responded yet by the end of April. The response rate was therefore of 3%, which is rather low.

The results

We herewith first communicate the results with respect to the usual measures used with the 19 groups that had been tested in the past (Mesly 2009 to 2012 – Annex B). These 19 groups were combined as one group of 834 participants that was to serve as a control group (CG). If indeed the constructs for the victim group (VG) and for the control group (CG) compare favorably, this would indicate that the population of victims (VG) is probably similar to the general population as expressed by the CG (see tables of interpretation Annex B).

The responses were as follows^{4,5}:

⁴ Given normality of residuals and populations.

⁵ All of our analyses use a 95% confidence level; $p < 0.05$ unless indicated otherwise.

Key constructs

Table 3 – Measures of the key constructs

Observation 1: A means comparison test (using Levene test for equality/inequality of variances) shows that all values are significantly different between the CG and the VG, except for the measure of prey and predator/prey (at $\alpha = 0.05$), which are found to be of no significant difference. This suggests that the VG certainly feels it is not able to fight back (predator) as much as the CG, which is expected given that after four years in Court, nothing has been solved. The VG has reached a point to where it does not feel prey more than the CG does, so that somehow the VG has accepted the fact of having been defrauded and has moved forward. The test however does not show a significant difference between the two groups in terms of predator/prey at $p=0.05$ (*) but finds one at $p=0.10$ (**).

Trust => Cooperation (R^2)

The link between trust and cooperation is as follows (Table 4):

Table 4 – Trust => Cooperation

Observation 2: Even though the regression was run on a small number of participants for the VG, the relationship between trust and cooperation is still supported, with a R^2 of 0.74. It is in line with past marketing research (Palmatier *et al.*, 2006)

Equilibrium as mediating variable

Equilibrium as a mediating variable is proven as follows (table 5):

Table 5 – Equilibrium as a mediating variable

Observation 3: This result points to the fact that there is a link between trust, equilibrium and cooperation. Rationalization (equilibrium) plays an important role for the VG.

Law of perceived predation

The law of perceived predation (Mesly, 2010) states that as perceived predation increases (tends towards 1) the values for the constructs for trust, cooperation, equilibrium and atmosphere go down (tend towards 0) altogether (always at similar levels⁶). When the value of perceived predation tends towards 0, then, inevitably, dyads tend to show more trust, cooperate, seek a sense of win-win (equilibrium) and thus establish a pleasant working atmosphere (the values of the constructs tend towards 1)⁷.

The factorial analysis results are as follows (table 6):

Table 6 – Factorial analysis on the grouping of 834 participants

Observation 4: The law of perceived predation is supported for the CG and the VG.

Cluster analysis

A cluster analysis reveals the following (Table 7):

Table 7 – Cluster analysis on the entire 834 sample

We did not run a cluster analysis on the small VG but retrieved the values (*) from table 4. It can be seen that the VG very much falls within the dominated-repulsive (avoidant) group. As Mikulincer and Shaver (2007, p. 279) point out:

“A large literature indicates that ... avoidant people are relatively disengaged during social interactions, easily become bored or tense, and ... try not to become either positively or negatively emotional but when they do, they tend to be angry, hostile, or disparaging.”

⁶ Hence, we call this group trust/cooperation/equilibrium the horizontal plan.

⁷ Hence, the vertical HPA plan and the horizontal plan are orthogonal.

This means that the vast majority of the VG respondents have actually decided to avoid dealing with their financial advisor, and most probably they also have decided to avoid dealing with the issue, which has been lingering for six years. This would partly explain why the response level of the questionnaires that were sent out (for the individuals whose addresses were confirmed by follow-up phone calls) was so low, at a mere 3 %. The VG feels it has been dominated (*i.e.* it is probably experiencing powerlessness to this day) and finds the situation repulsive.

A separate set of questions and qualitative interviews (and written self-reports spontaneously provided by some participants) show that six years after the events, one can still feel traces of anger; to reckon, rage (anger) is one the key defensive behaviors generated by the hypothalamus.

All in all, the results show that the VG very much feels like a victim, that it has adopted an avoidant stand in the face of a situation where it feels dominated and that it finds repulsive (See figure 2).

Figure 2 – A simplified view of the impact of financial predation

There is substantial anger (defensive rage) persisting as expressed by the low level of response to the questionnaire, the values to the key constructs which are clearly biased towards current feelings, the very responses to the questionnaire and feedback given in qualitative interviews and self-initiated written reports. The victims are not predators and have not adopted a predatory stance; they are prey and feel like prey. They have adopted a defensive strategy. The impact of financial predation experienced more than six years ago is still lingering, albeit at a manageable level. Everything (including a SEM done separately) indicates that the VG tries to deal with its on-going anger by rationalizing the situation and finding a new equilibrium in life.

CONCLUSION

Our initial question was with respect to better understanding the impact of financial predation on victims. We first reviewed the literature on predation and perceived predation and presented the simplified Mesly model of financial predation. We discussed the fundamental role of the hypothalamus, and made several links to marketing literature and concepts, such as that of attitude. We

came to have a better profile of the financial predator. We also obtained a profile of the prey, that is, the victim of a particular financial fraud that took place prior to 2006.

Judging from the impact we detected in our study (despite its numerous limits such as the low return rate), we can venture to say that in some form financial predators are violent individuals indeed: they cause harm. They can potentially be classified as “functional psychopaths” even though this terminology does not exist in the DSM IV (APA) but will likely appear in its fifth version.

If indeed it were possible to test financial predators through such devices as fMRI, this can achieve three things. First, it will give strong evidence about the functioning of financial predators, thus allowing regulatory bodies to better detect and punish them. Second, it will bring additional neurobiological facts to a phenomenon that has been initially developed in a marketing context: in fact, the number of marketing models found in the scientific marketing literature that are supported by medical evidence is quite limited. Finally, it will offer the neurobiological field a way of looking at the brain as it behaves in a particular situation, that is, in marketing situations involving a buyer and a seller of financial products and services.

In 2012, the author received a grant that will allow him to perform an fMRI-based study to test the up-graded version of the Mesly model in anticipation of the much-needed work on detecting financial predators. Results of this study should come out in 2013.

REFERENCES

- American Psychiatric Association. (1994) *Diagnosis and Statistical Manual of Mental Disorders* (DSM-IV), 4th edition. Washington, DC: American Psychiatric Association.
- Baron, R.M. et Kenny, D.A. (1986) The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 51(6), 1173-1182.
- Bell, G.G., Oppenheimer, R.J. et Bastien, A.. Trust deterioration in an international buyer-supplier relationship. *Journal of Business Ethics* 36(1/2), (2002), pp.65-78.
- Bergeron, J. and Laroche, M. (2009). The effects of perceived salesperson

- listening effectiveness in the financial industry. *Journal of Financial Services Marketing* 14(1), 6-25.
- Bowlby, J. *Attachment and loss: Vol. 2. Separation: Anxiety and Anger*. New York: Basic Books. (1973).
- Bowles, J. T. (2000). Sex, kings, and serial killers and group-selected human traits. *Medical Hypotheses*, 54(6), 864-894.
- Christie, R. and Geis, F.L. (1970). *Studies in Machiavellianism*. New York: Academic Press.
- Gottman, J. M. (1993). The Roles of Conflict Engagement, Escalation, and Avoidance in Marital Interaction: A Longitudinal View of Five Types of Couples. *Journal of Consulting and Clinical Psychology*, 61(1), 6-15.
- Hellwig, M.F. (2009). Systemic Risk in the Financial Sector: An Analysis of the Subprime-Mortgage financial Crisis. *De Economist* 157, 129-207.
- Johnsson, J.I., Rydeborg, A. and Sundström, L.F. (2004). Predation risk and the territory value of cover: an experimental study. *Journal of Behavioral and Sociobiology Studies* 56, 388-392.
- Mayer, R.C., Davis, J.H., et Schoorman, F.D. (1995). An Integrative Model of Organizational Trust. *The Academy of Management Review*, 20(3), 709-734.
- Mesly, O. (2009). *Les Équilibres dynamiques de prédation : une modélisation mathématique*. Sprout Proceedings, Ottawa, Canada.
- Mesly, O. (2010). *Voyage au cœur de la prédation entre vendeurs et acheteurs- une nouvelle théorie en vente et marketing*. Université de Sherbrooke, Canada.
- Mesly, O. (2011a). *Une recherche différente en vente et marketing*. Québec : PUQ.
- Mesly, O. (2012). *Comment les bandits à cravate s'y prennent-ils ?* Montréal : Béliveau éditeur.
- Mesly, O. (2012a). Detecting financial predators ahead of time...a two-group longitudinal study. Submitted.
- Mesly, O. (2012b). *The emotional edge of financial predators - a four group longitudinal study*. WINNER OF 2012 THE INBAM AWARD FOR BEST ARTICLE IN BUSINESS RESEARCH. Submitted.
- Mesly, O. and Lévy-Mangin, J.-P. (2012). *The narrow range of perceived predation – a 19 group study*. Submitted.
- Mesly, O. and Racicot, F.-É., (2012). A note on financial predation: a marketing assessment. *Journal of Wealth Management* 15 (1), 101-103.
- Mesly, O. (2012c) A views at the economic impact of financial predation.

- Research in Business and Economics Journal* 6. (July), 57-66.
- Mikulincer, M. & Shaver, P. R. (2007). *Attachment in Adulthood-Structure, Dynamics, and Change*. New York: The Guilford Press.
- Palmatier, R. W., Dant, R. P., Grewal, D. and Evans, K. R. (2006). Factors influencing the effectiveness of relationship marketing: A meta-analysis. *Journal of Marketing*, 70, 136-153.
- Pelletier, K.R. (1993). *Between Mind and Body: Stress, Emotions, and Health* dans Goleman & Gurin.
- Poitras, J., Stimec, A. and Roberge, J.F. (2010). The negative impact of attorneys on workplace mediation outcomes: a myth or a reality? *Negotiation Journal* 2010 vol. 26: 1, 9-24.
- Purves, D., Augustine, G.J., Fitzpatrick, D., Hall, W.C., LaManta, A.-S., McNamara, J.O. and Williams, S.M. editors (2004). *Neuroscience*, 3rd edition. Massachusetts: Sinauer Associates Inc. Publishers.
- Rajan, R. (2010). *Fault Lines*. US: Princeton University Press.
- Riedl, R. and Javor, A. (2012). The Biology of Trust: Integrating Evidence From Genetics, Endocrinology, and Functional Brain Imaging. *The Journal of Neuroscience, Psychology, and Economics* 5(2), 63-91.
- Rosebloom, P. H., Nanda, S. A., Bakshi, V. P., Trentani, A., Newman, S. M. and Kalin, N. H. (2007). Predator threat induces behavioral inhibition, pituitary-adrenal activation and changes in amygdala CRF-binding protein gene expression. *Psychoneuroendocrinology*, 32, 44-55.
- Shapiro, G.K. and Burchell, B.J. (2012). Measuring Financial Anxiety. *Journal of Neuroscience, Psychology, and Economics* 5(2), 92-103.
- Siegel, A. and Sapru, H.N., (2011). *Essential Neuroscience*, 2nd edition. Baltimore: The point: Wolters Kluwer, Lippincott; Williams & Wilkins.
- Squire, L.R., Bloom, F.E., McConnell, S.K., Roberts, J.L., Spitzer, N.C. Zigmond, M.J. editors. *Fundamental Neuroscience*, 2nd edition. Academic Press (Elsevier Science).
- Szwajkowski, E. (1985). Organizational Illegalities: Theoretical Integration and Illustrative Application. *Academy of Management Review* 10(3), 558-567.
- Verbeke, W.J.M.I., Riedtdijk, W.J.R., van den Berg, W.E., Dietvorst, R.C., Worm, L. and Bagozzi, R.P. (2011). The Making of the Machiavellian Brain: A Structural MRI Analysis. *The Journal of Neuroscience, Psychology, and Economics* 4(4), 205-216.
- Williamson, O.E. (1981). The economics of organization: The transaction cost approach. *American Journal of Sociology* 87(3), 548-577.

Fig. 1 – The Mesly model of financial predation (simplified)

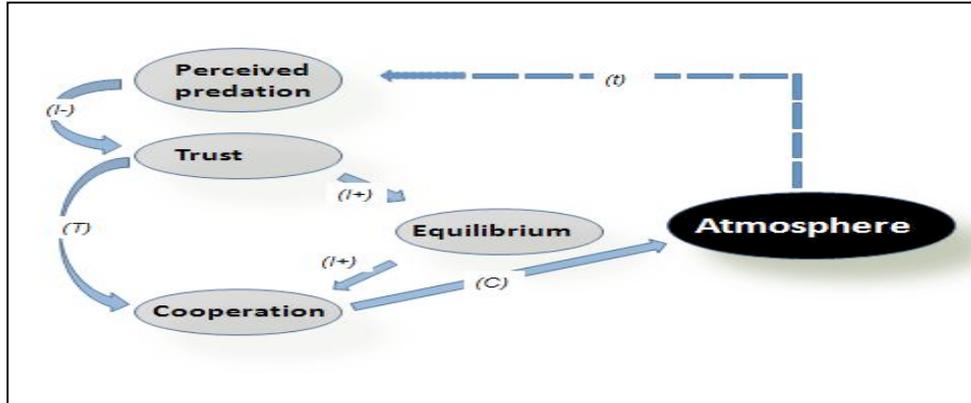


Table 1 - Efferent from (11) and Afferent to (9) the hypothalamus

Efferent	To brain structure	Efferent neuron connections	
PREDATION (3)			
From hypothalamus	Pituitary gland	Efferent connection known as the HPA axis (with “A” for adrenalin) ⁺	
	Locus coeruleus (related to noradrenergic)	Predation (role in sleep) ⁺	
	Raphe nuclei (related to serotonergic)	Predation (role in sleep) ⁺	
	TRUST/EMOTION/ATTACHMENT (2)		
	Stria terminalis	Emotion	
	Amygdala*(connects with thalamus and hippocampus) ⁺	Emotion/Attachment	
	COOPERATION/SOCIALIZATION (3)		
	Thalamus (connects with pre-frontal cortex) ⁺	Socialization	
	Septal area*	Socialization (even if it is traditionally considered part of the limbic system) ⁺	
	Cingulate gyrus* via thalamus	Socialization (role in schizophrenia)	
	EQUILIBRIUM/RATIONALIZATION (3)		
	Fornix	Connection hippocampus-mammillary bodies	
	Hippocampus*	Rationalization	
	Prefrontal cortex (via thalamus; acts on homeostasis)	Rationalization	

	+	
	NONE	
	None towards tegmentum	-----
	None towards Periaqueductal gray (PAG)	-----

(*) Considered part of the limbic structure in traditional neuroscience.

(+) Fully supports the simplified Mesly model of financial predation

From brain structure	To hypothalamus	Afferent neuron connections
PREDATION (2)	To Hypothalamus	
Pituitary gland		No afferent+
Periaqueductal gray (PAG)		Predation
TRUST/EMOTION/		ATTACHMENT (1)
Amygdala*		Emotion/Attachment
COOPERATION/		SOCIALIZATION (3)
Septal area*		Socialization
Thalamus		Socialization
Cingulate gyrus* via thalamus		Socialization (role in schizophrenia)
EQUILIBRIUM/		RATIONALIZATION (2)
Hippocampus*		Rationalization
Prefrontal cortex		Rationalization
ATMOSPHERE/		HOMEOSTASIS (1)+
Tegmentum+		Homeostasis

(*) Considered part of the limbic structure in traditional neuroscience.

(+) Fully supports the simplified Mesly model of financial predation.

Table 2 – A preliminary view at the brain

Vertical plan – Dominant-dominated HPA axis		
Predatory behavior (at moment of attack) or prey under attack	Some of the chemicals involved:	Cortisol, adrenalin, testosterone (involved in dominance), arginine vasopressin (territoriality)
	Some of the brain structures involved	Hypothalamus; pituitary gland, adrenal glands; cerebellum; autonomic nervous system (sympathic and parasympathic)
	Others	Leukocytes, microglia
Horizontal plan		

Emotion (Trust => attachment ⁸)	Some of the chemicals involved:	Oxytocin (released by the pituitary gland under the control of the hypothalamus)
	Some of the brain structures involved	Amygdala, anterior cingulate cortex (ACC), subgenal anterior cingulate cortex (subACC)
Conation (Cooperation => socialization)	Some of the chemicals involved	Pheromones (mostly in animals)
	Some of the brain structures involved	Thalamus, Broca area, primary motor cortex, associative prefrontal cortex, infero-temporal gyrus, striatum, orbital frontal cortex (OFC)
Cognitive (Equilibrium => rationalization)	Some of the chemicals involved:	Acetylcholine
	Some of the brain structures involved	Hippocampus, prefrontal cortex, caudate nucleus, accumbens
Atmosphere (Hypothesized and actual homeostasis)	Some of the chemicals involved	Dopamine, serotonin
	Some of the brain structures involved	Nucleus ambiguus; All functional systems: immune, autonomic, endocrinal, neuropeptic, etc.

**The so-called "hypothesized atmosphere" is calculated as (trust+cooperation+ equilibrium)/3 – see Mesly, 2010.*

Table 3 – Measures of the key constructs

Population (n= 834) for the control group (CG)							
	Scale of 0 to 100				Likert scale of 1 to 7		
	Trust	Cooperation	Equilibrium	Atmosphere	Predator	Prey	Predator/Prey
Value	76	77	76	76	3.97	3.22	1.50
Minimum	18	18	14	34	1.00	1.00	1.00
Maximum	100	100	100	100	7.00	7.00	7.00

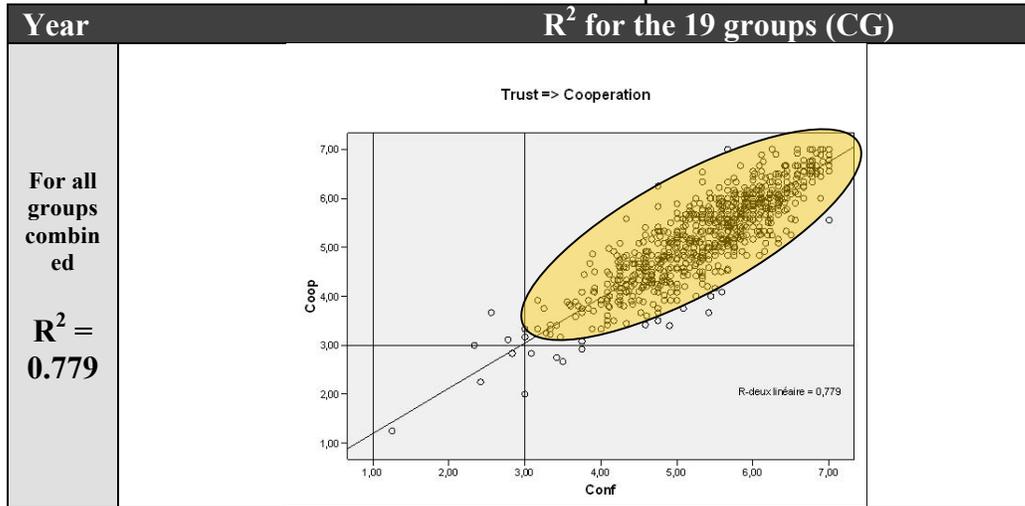
Population (n= 26) for the Class action participants (VG)							
	Scale of 0 to 100				Likert scale of 1 to 7		
	Trust	Cooperation	Equilibrium	Atmosphere	Predator	Prey	Predator/Prey

⁸ As an example of the inevitability of attachment, newborns depend completely on others for body heat, food, fluids and cleanliness).

Value	61	57	58	62	3.4	3.1*	1.14**
Minimum	25	25	25	29	1.85	1.60	0.68
Maximum	71	69	76	76	5.00	4.66	1.67

Calculated Atmosphere (Hypothesized atmosphere: 58, min.: 26; max.: 70).

Table 4 – Trust => Cooperation



* Legend: Conf = trust; Coop = cooperation. Normal residuals and populations.

Table 5 – Equilibrium as a mediating variable

Population (n= 26) for the Class action participants (VG)		
Trust => Cooperation	Coop. = n.s.* + .845 Trust + ϵ	$F= 68.463; p = .000$
Trust =>Equilibrium	Equi. = n.s. + .825 Trust + ϵ	$F= 44.306; p = .000$
Equi. => Cooperation	Coop. = n.s. + .883 Equilibrium + ϵ	$F= 135.502; p = .000$
Trust + Equi. => Coop.	Coop. = n.s. + .330 Trust + .624 Equi. + ϵ	$F= 92.358; p = .000;$ Durbin-Watson = 1.978 < 10
Trust coefficient change for the VG group	Reduction from 0.845 to 0.330	
Trust coefficient change for the CG	Reduction from 0.925 to 0.765	

*n.s. = found not significant (> 0. 05). Using Baron and Kenny (1986) test.

Table 6 – Factorial analysis on the grouping of 834 participants
Population (n= 834) for the control group (CG)
and for the VG (n=26)

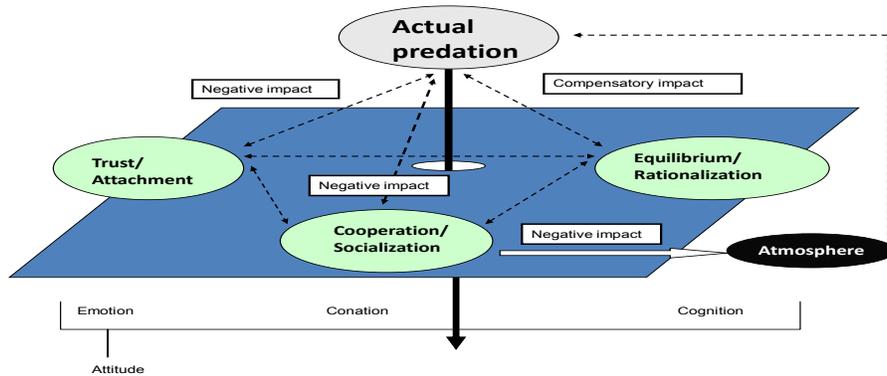
Tends towards				
	Component 1		Component 2	
Trust	0.946/ 0.935	1	0.071/0.002	0
Cooperation	0.936/0.942	1	0.144/0.214	0
Equilibrium	0.906/0.935	1	- 0.013/0.148	0
Predator	0.342/0.377	≈ 0	0.744/0.750	1
Prey	-0.150/0.112	0	0.865/0.989	1
Predator vs. Prey	>		<	

*Varimax rotation; 3 iterations*Note: the VG being quite small, this factorial analysis is to be considered with its limits.

Table 7 – Cluster analysis on the entire 834 sample

Population (n= 834) for the control group (CG)					VG*
Class (rounded-up numbers)					
	1	2	3	4	
Trust	90	81	64	84	61
Cooperation	90	79	63	83	57
Predator	5.5	3.3	3.3	5.2	3.4
Prey	1.3	2.3	3.5	4.7	3.1
Predator/Prey	4.7	1.5	1.0	1.2	1.14
Number of observations	57	315	239	223	26
Likely personality type	Hostile ⁹	Stable	Avoiding	Anxious	Avoiding
% of population	7	38	29	27	-----
Quadrant¹⁰	Dominant-repulsive	Dominant-seductive	Dominated-repulsive	Dominated-seductive	Dominated-repulsive

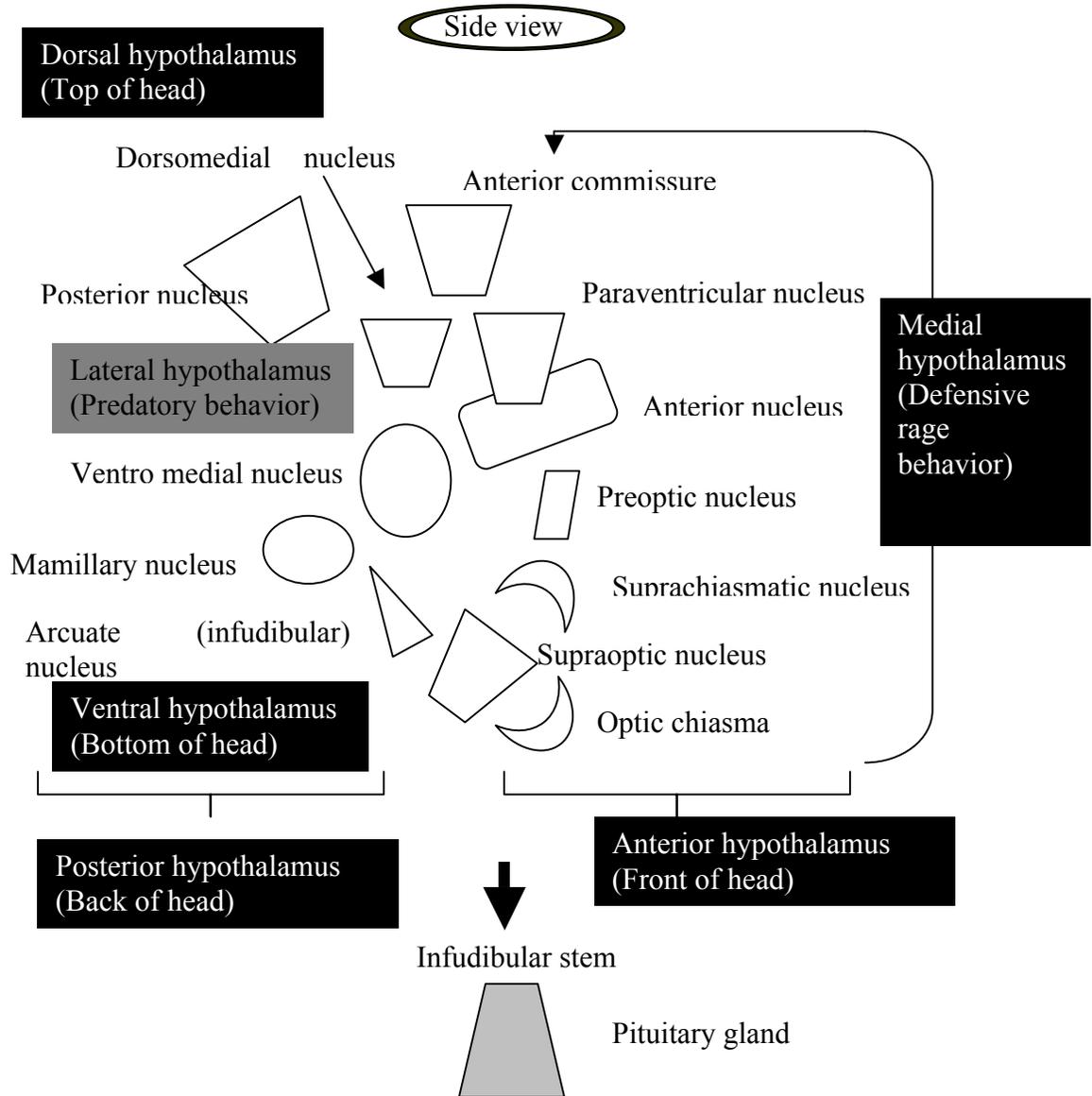
Figure 2 – A simplified view at the impact of financial predation



⁹ Gottman (1993) demonstrates that the hostile group exists indeed. He separates it in two sub-groups: hostile and hostile-avoiders.

¹⁰ This is in line with Shapiro (2010) proposed axes: one for autonomy, and the other one for affiliation. Dominance and seduction are the two main axes of animal behaviors (see Bowles, 2000, p. 870, among others).

Annex A: The hypothalamus and its parts (one side only; in fact, the hypothalamus has two sides)



Annex B: Populations and Tables of interpretation

Table 8 – Populations

Year	Population (n) for the 19 groups (CG)						
2008	G1=35	G2=28					
2009	G3=26	G4= 57	G5=27	G6=32	G7=75	G8= 78	G9=73
2010	G10= 184	G11= 13					
2011	G12=26	G13=24	G14=25	G15=26	G16=24	G17=25	
2012	G18=28	G19=28					
Total	834						
Year	Population (n) for the Class Action (VG)						
2012	G20= 26						

Table 9 – Tables of interpretation

Construct	Value	Type	Emo tional involve ment	Type of commitment
For Trust and cooperation	4 to 5	Transactional	Little	Almost indifferent
	5 to 6	Relational	Moderate	Trust-driven
	6 to 7	Interpersonal	High	Blind trust

Construct	Value	Zone	Likely Emotion	Outcome
For predator or prey	4 and above	Conflict	Hostility	Strenuous
	2 to 4	Normal	Amicable	Lasting
For the Predator/Prey ratio	Above 1.8	Conflict	Hostility	Strenuous
	1.2 to 1.8	Normal	Amicable	Lasting
	Below 1.2	Conflict	Hostility	Strenuous

See Mesly, 2010.