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PRIMARY PROCESS PREDOMINANCE IN LATE PREGNANCY

EMPIRICAL EVIDENCE FOR PSYCHIC TRANSPARENCY IN PREGNANCY

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Bydlowski has proposed that pregnant women show an altered mental state, qualified as 'psychic transparency', characterized by a lowering of the usual defenses against the repressed unconscious and the parallel surfacing of (infantile) reminiscences, fantasies and representations. This state of highly invested mental work is thought to be characterized by a predominance of primary process mentation. The Geo-Cat, a simple non-linguistic instrument for the probing of primary and secondary processes, revealed a substantial increase in primary process mentation in pregnant women compared with control groups (n = 118 pregnant women from their 6th to their last month of pregnancy, n = 81 nonpregnant control women, n = 78 future fathers, and n = 40 control men). This difference remained highly significant after factoring out the influence of confounding variables. Also, this increase was not different between women giving birth for the first time, and women, having a second or subsequent child. For all these reasons, we are drawn to think that it is the mere event of having another being growing inside one's own body, which, by requiring huge mobilization of mental energy, dries up the mental sources required to maintain the usual defenses. As a consequence, primary process mentation would be at work, resulting in a so-called 'psychic transparency' state. This mental explanation is an alternative for a mere biological and deficit interpretation, as it allows us to consider the function of this state, both for the mother-to-be and for the mother-infant bond.

Keywords: primary process, psychic transparency, Bydlowski, pregnancy, GeoCat

The French psychiatrist and psychoanalyst Bydlowski (1991, 1995, 2001, 2002) observes that during clinical interviews pregnant women surprisingly often don't talk much about their unborn child but, rather, speak naturally and in disinhibited ways about their fantasies, childhood experiences, traumas, conflicts, frustrations, desires, relationships with parents, etc. (see also Racamier et al., 1961; Racamier, 1998). She proposes that these women are going through a period of mental rearrangements, described as "a phenomenon which, clinically, often characterizes serious mental disorders, including psychosis [and] arises in pregnancy as a regular

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event” (Bydlowski, 2002, p. 92¹). This situation, then, results from a state of “psychic transparency” (*transparence psychique*) characterized by a lowering of the woman’s usual defenses against the repressed unconscious and by a narcissistic polarization around her own history. Bydlowski (1997, p. 97) proposes that the presence of a unseen, secret object which is indistinct from herself, would induce a narcissistic invasion movement in the pregnant woman:

“The intensity of this invasion is comparable to that of enamoration. The amorous state realizes a similar invasion of the psyche, but in the pregnancy the object is not distinct from itself. In the same movement, the mental themes outside of this narcissistic invasion are disinvested. Counter-investment no longer keeps them secret. When disinvested like that, they are indulged without restraint in the spontaneous speech of the pregnant woman. (p.97)

Thereby, reminiscences resurface which, outside of pregnancy would be kept secret because they are too confrontational or taboo. The psychic transparency phase is considered part of a constructive process as the reactivation of these contents puts the young woman in phase with the emerging functioning of the child’s psyche (Siksou & Golse, 1991) and thereby takes part in the shaping of the mother-infant interactions (Bydlowski, 2000; Bydlowski & Golse, 2001; see also Bellion, 2001), what Helene Deutsch (1945, p. 161) also calls “the subtle correlations between mother and fetus”.

Bydlowski and Golse (2001) add: “Thus, the future mother, *especially during the second half of the pregnancy*, will gladly turn to subjects that are self-centered and inaccessible for most women outside this period of her life.” (p. 31, our italics). These authors propose to distinguish the period of mental transparency from the prenatal period of Winnicott’s primary maternal preoccupation. Indeed, Winnicott

¹ This and all further translations of quotes from French-language references are ours.

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(1958) also points to this “very special state of the mother” as “a state of heightened sensitivity” which compares “with a withdrawn state, or a dissociated state, or a fugue, or even with a disturbance at a deeper level such as a schizoid episode in which some aspect of the personality takes over temporarily” (p. 301-302, for a non-pathologizing re-reading of Winnicott, however, see e.g. Hollway, 2011). Even if Bydlowski and Golse (2001, p. 30) propose that in the transition from psychic transparency to primary maternal preoccupation in approximately the last month of pregnancy, there is a shift in maternal attention from the inside to the outside, i.e. from the self to the infant to come (which, at the end of pregnancy, mentally acquires an external status), Winnicott stresses the (“dissociated”, “schizoid”) form, but does not elaborate on the content, of the primary maternal preoccupation. For these reasons, it might also be argued that this second part of pregnancy is, from the point of view of the mental forms, a continuous unit rather than falling apart in two different kinds of phases.

It is precisely the centrality of a formal dynamic, rather than a content qualification, which distinguishes Bydlowski’s concept of psychic transparency from a number of other related concepts from which it undoubtedly also draws its inspiration. Briefly, the psychoanalysts Grete Bibring (1959) and Thérèse Benedek (1959) propose that pregnancy is a phase of important identificatory changes, comparable to changes in puberty or menopause. Based upon this work, the French psychiatrist Paul-Claude Racamier and colleagues (1961), then, use the term “*maternity*” to describe the “the whole set of psycho-affective processes that develop and integrate in women during motherhood” (p. 532). Racamier and Winnicott qualify the nature of this (maternal preoccupation/maternality) phase in terms of pathology, be this under the form of a (developmental) crisis, or as a psychotic-like mental illness. More

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recently, authors have also stressed the issue of maternity as a complex, hazardous and/or vulnerable psychic process (see e.g. Cramer & Palacio-Espasa, 1993; Stern, 1995; Pola, 1999, p. 8; Mokrani et al., 2012) – Bergeret-Amselek (1996) speaks of the "trauma of maternity" (see also Missonnier, 2009). By giving a dynamical state, psychic transparency, the key constitutive role – as in contrast with a reference either to the theme of motherhood or to an affective difficulty – we feel Bydlowski makes a side step opening up for a logical understanding of this phase with neither an a priori content interpretation nor, for that matter, a potential problematization or pathologization.

Generally speaking, authors mention as a main dynamic characteristic for mental transparency the temporary lifting of resistance or repression (e.g. Bydlowski, 1991, 1997), defense (e.g. Notman & Lester, 1988), or censorship (e.g. Mokrani et al., 2012, p. 133). Clinical case studies (e.g. Picco, 2005) indeed illustrate how pregnant women openly speak about their childhood and especially about their relationship with their mother (see also Deutsch, 1945; Le Nestour, 2003) and traumatic areas of their history. In Freud's (1895) project for a mental architecture, the lifting of repression enables burgeoning of so-called *primary process mentation* which is first and foremost characterized by associative thought (see further). Indeed, almost all pregnant women seem to struggle with distraction, emotionality, slips and parapraxes (e.g. Missonnier, 2004, p. 134) and many lose the thread of their sentences or thoughts and dream more intensely (e.g. Lara-Carrasco et al., 2014; Cailleau, 2009). Picco (2005) indicates that the primary dimension of psychic transparency is "maternal mental work", qualified as a "work of associating", an "increased investment in the process of thought": the pregnant woman summons her

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“abilities to think and dream the child to come”, recruiting “the mental abilities of linking, associating, transforming” (pp. 19-23).

For these diverse reasons, we start from the main idea that this particular mental state in pregnant women, particularly in the second half of pregnancy, and which has been qualified as psychotic-like (e.g. Fericelli, 2007, p. 421), or “archaic” (e.g. Proia-Lelouey & Schvan, 2011, p. 170) but also as “associative”, “effervescent” and “fleeting” (Picco, 2005, p. 20), is a mental state dominated by Freudian primary processes (see e.g. Freud, 1911/1958). This was also suggested by Oriol et al. (2016) who propose that psychic transparency “could be explained by the porosity of the preconscious area to primary processes as a result of the partial decrease in the censorship of thought” (p. 2).

Freud (1900/1953, p. 452), indeed, proposes two ways in which the mental apparatus functions: The primary process refers to an associative mode of thought, typical of the unconscious; the secondary process refers to the elaborate and rational mode of thought, typical of the conscious. From an economic-dynamic point of view, in the primary process, the mental energy flows freely from one representation to another by displacement and/or condensation, and finally seeks for discharge through the shortest possible way: This is the pleasure principle (p. 510). Moreover, in this primary process mode, seemingly irrational associations are made under the non-contradiction principle (p. 602; Holt, 2009). The secondary process, to the contrary, uses elements of reality to select the items that are consonant with the context, and inhibit the ones that are not (Bazan, 2007a; Freud, 1895/1900, 1900/1953). Indeed, the secondary process functions to inhibit and control the primary process. Thereby it can handle time and spatial distinctions and connect

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ideas, independently of the intensity of the excitation related to them (Freud, 1900, p. 602).

When it comes to pregnant women, several studies investigate the mental state of these women. From a more cognitive point of view, memory problems are objectified in pregnancy, with pregnant women being more forgetful (e.g. Henry & Rendell, 2007). Dreams of pregnant women are reported to have more morbid and emotional content (e.g. Mancuso et al., 2008; Lara-Carrasco et al., 2014). However, results are mixed as e.g. Bellion (2001), testing with projective tools like the Rorschach and the Thematic Apperception Test, to the contrary, report restrictive and inhibited protocols in pregnant women, as well as conflict avoidance (but see further). Also, Oriol et al. (2016), testing the concept of psychic transparency by having (pregnant and control women) associate freely about their dreams during 5 minutes and by having these associations evaluated by different groups of judges, find no evidence for its presence in pregnant women. Interestingly, in clinical research based on case studies, Picco (2005) qualifies the typical associative mental investment of pregnant women by saying that “more than an original psychic work, it is, in sum, the amplification of what constitutes the ordinary function of thought.” (p. 23). This fits well with our idea of the nature of primary process mentation, namely that it is the primary process, which produces the positive contents, and thus the substance, of thought and that the secondary process is merely, but importantly, an inhibition, and thereby an organization principle.

Our wish is to target specifically the mental dynamical logic which is thought to underly the psychic transparency, namely the primary process mentation. To do this, we benefit from an instrument, which we have helped to develop, and which has proven effective in other clinical situations where the primary process is exacerbated,

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namely the so-called GeoCat. GeoCat stands for *Geometrical Categorization* (Brakel, Kleinsorge, Snodgrass, & Shevrin, 2000) and asks for similarity judgments between geometrical figures: a judgment based on attributional (ATT) similarity and another one on configurational/relational (REL) similarity (see Figure 1). The ATT-alternative is composed by all components of the master figure but in a different configuration; the REL-alternative has different components but in the same configuration as the components of the master figure.

Which target figure below is most similar to the top central figure?

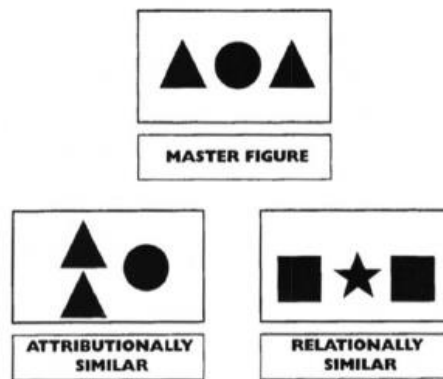


Figure 1. Didactic example of the GeoCat principle (Brakel et al., 2000). Note that the item below is not a real item from the GeoCat.

The main idea, as presented before (Bazan et al., 2012; Vanheule et al., 2011), is that primary process treatment results in association compulsion on the basis of superficial features or “attributes” and thus ATT similarity judgment, while secondary process treatment enables a perspective upon the stimuli, taking the total configuration and the mutual relations of the composing elements into account, resulting in configurational similarity judgment (i.e., REL). The secondary process is able to proceed as such due to its ability to inhibit the automatisms of the primary process’ superficial connections (Bazan, 2007a, 2007b; Freud, 1900/1953; Shevrin,

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Bond, Brakel, Hertel & Willimas, 1996). In particular, the access to the space judgment is possible through the secondary process, while the primary process is characterized by the spatial and temporal confusion (Bazan, 2007a, 2007b; Kapsambelis, 2005, p.64). Thus, the instrument enables us to infer the relative dominance of primary and secondary mentation in mental functioning by the “catching” of a proximal characteristic or a probe for these processes (namely, similarity in attributions or in total configuration of the components, respectively); this type of inference we will also call “measurement”. Several studies inform the validity of the GeoCat method. Indeed, in all instances where psychoanalytic literature predicts a predominance of primary process, an increase in attributional responses on the GeoCat is shown: namely in unconscious processing (Brakel et al., 2000), young children (Brakel, Shevrin, & Villa, 2002), anxious adults (Brakel & Shevrin, 2005) as well as in psychotic patients (Bazan et al., 2012). Construct validity and internal consistency of the GeoCat are also demonstrated by Vanheule and colleagues (2011).

This article thus proposes an empirical verification of Bydlowski’s psychic transparency hypothesis with the GeoCat instrument. In other words, will pregnant women in the last four months of their pregnancy (see also Bibring, Dwyer, Huntington, & Valenstein, 1961) show an increase in primary process mentation, measured as a higher number of ATT-choices on the GeoCat, as compared to non-pregnant women of a similar age? In parallel to the pregnant and the control women, we also probe for primary and secondary process mentation with the GeoCat in future fathers and control men. Our results show an impressive upsurge of primary process mentation in pregnant women in the second half of their pregnancy, in

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comparison to control groups. This increase is not explainable by other confounding factors, and therefore primarily connected to the pregnancy.

Method

Participants.

Table 1 summarizes the demographic data of experimental and control populations. The average number of weeks of pregnancy is 31.2 weeks with a SD = 4.4. Fifty of the 119 participants (42%) are first-time mothers, 39 have one child, 18 have two children, nine have three, two have four and one has five children. Fathers are all companions of women in the third trimester (27 to 40 weeks), though not of the women in the experimental group of this study. Control men are partners of women who are not pregnant (or not aware of being pregnant). Half of the pregnant women were met in hospital (Erasmus Hospital and Saint-Pierre Hospital, both in Brussels) whereas the control women were met outside hospital at their home. The ethics oversight committees of both hospitals approved the research; individual participants gave informed consent for the research. All data obtained are registered and stored anonymously.

Table 1
Demographic Data

Group	N	Age ^a	% Right-handed ^b	% French mother tongue ^c	% Highly educated ^d
Pregnant women	119	30.7 ± .5 ^e	89.9	59.7 ^{e,f,g}	38.7 ^{e,f,g}
Control women	81	33.4 ± 1.2	85.2	88.9	71.6 ^f
Future fathers	78	31.2 ± .9	87.5	88.6	53.4 ^g
Control men	40	31.1 ± 1.4	85.5	92.3	75.0

^a Age (in years) ± SEM. ^b Lateralization in percent of right-handed people. ^c Mother tongue in percent of people with French as mother tongue. ^d Percent of people with an education level higher than high school (18 years). *p* < .05 significantly different from ^e control women, ^f future fathers, and ^g respectively control men.

Procedure

After oral consent, two instruments are proposed; total testing time was approximately 10 minutes.

GeoCat. The GeoCat consists of six items; each item includes a master figure and two target figures under the master figure. The instruction was as follows: “There are 6 squares on this page. Each square shows a triad of geometrical figures, one master figure on top and two target figures below. Which target figure below is *most similar* to the top central figure?”² (see also Figure 1). We worked with the paper version of GeoCat 1.2 adapted by Bazan at the *Université Libre de Bruxelles* (ULB). There are four different versions to control for preference bias (figures are alternatively master or target), as well as for lateralization bias (left-right positions are alternated). The version of GeoCat has no effect on the number of attributional choices ($p=.603$). The alpha of Cronbach for the six items is high (0.916), confirming there is no item effect.

L’Inventaire d’Anxiété Situationnelle et de Trait d’Anxiété (IASTA-Y).

The French version of the State-Trait Anxiety Inventory (Gauthier & Bouchard, 1993; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) measures both self-reported situational and trait anxiety. After this, participants are debriefed, and thanked.

Data-analysis

Given the non-normal distribution of the frequencies of the number of ATTs on the GeoCat (see Figure 2), nonparametrical statistical tests were used; both the Mann-Whitney U and the Wilcoxon were used. As results were essentially the same,

² in French: « Il y a 6 carrés sur cette page, chaque carré montre une triade de figures géométriques, une figure maître au-dessus et deux figures cibles en-dessous. Quelle des deux figures cibles du dessous est la plus similaire à la figure du dessus? ».

only the Mann-Whitney U is mentioned. For the non-parametric correlations, we used Spearman's ρ .

Results

Pregnant women had significantly more attributional responses (ATT) than non-pregnant women and than future fathers. The histogram in Figure 2 shows that this is due in particular to the much higher number of pregnant women with "6 ATT" protocols (i.e. six ATT choices on a maximum of six), that is to say, with exclusively ATT choices.

Table 2 shows that pregnancy correlated with a real shift to ATT preference. This difference is highly significant: for the mean number of ATT answers the statistical Mann-Whitney $U = 3231.5$ (non-normal distribution) has a bilateral p value $<.001$ for the comparison with non-pregnant control women and $U = 3408.5$ with a bilateral p -value $=.001$ for the comparison with future fathers and $U = 1499.5$ with a bilateral p -value $<.001$ for the comparison with control men. There were no differences between control groups. There were also significantly more pregnant women than control women and than control men who give a majority of ATTs ($\%ATT > REL$), as well as significantly more pregnant women than controls who gave an exclusive ATT protocol ($\%6ATT$).

Pregnant women were not significantly more anxious than control women, though regarding situational anxiety only, there was a non-significant tendency for pregnant women to be more anxious than non-pregnant women ($p = .085$; contrast with Bonferroni correction). As found previously (e.g., McCleary & Zucker, 1991; Nakazato & Shimonaka, 1989; Spielberger, Gorsuch, & Lushene, 1970; Tanaka-Matsumi & Kameoka, 1986), women were more anxious than men.

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Various factors, other than pregnancy, can explain the finding of an exacerbated attributional response in future mothers. In our sample, we had significantly fewer women with French as a first language and with higher education in our experimental (pregnant) group, as compared to controls (see Table 1). Correlational analyses (in total population) show that mother tongue ($\rho = -.133$, $p = .036$) and the level of education ($\rho = -.184$, $p = .004$) were negatively correlated to the number of ATTs, that is, speaking another language than French (in the French-speaking part of Belgium) and having less education was correlated to higher ATT scores. After partial correlations of these factors which could contribute to an alternative explanation for the high in number of ATTs in the pregnant women, the effect of pregnancy upon the number of ATTs remained highly significant ($r = .201$, $p = .007$; Spearman partial correlation³). Finally, we also tested if place of testing (inside or outside hospital) influenced the number of ATTs, and this had no influence. In conclusion, after verification of all potentially confounding variables, pregnancy remains the only clinical criterion, which explains the high rise in ATT choices in the pregnant women.

Furthermore, from the sixth to the ninth month of pregnancy, there was no impact of the progress of pregnancy in number of weeks on mean number of ATT-responses ($\rho = .078$; $p = .398$) nor on the proportion of population with more ATT than REL responses ($\rho = -.049$; $p = .600$). However, the proportion with exclusively ATT-responses (i.e. six out of six) increased slightly with increasing number of weeks of pregnancy ($\rho = .211$; $p = .021$). This is also illustrated in Figure 3, which shows the

³ The Spearman partial correlation is equal to the Pearson correlation between the residuals of the linear regression of the ranks of the two variables on the ranks of the partialled variables (see for example Howell, 1997, p. 289). Results are virtually the same as those calculated on the residuals of the variables without ranking them first.

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histograms of ATT responses on the GeoCat in control women as well as in pregnant women in function of the month of pregnancy.

As concerns the influence of primiparity, the number of children had no influence on the mean number of attributional responses ($\rho = .019$; $p = .836$) nor on any of the other ATT parameters. As sample sizes for each case are small, we also compared first time mothers with already-mothers (50 vs 69). None of these tests gave statistical differences: There was no difference in mean number of ATTs ($U=1668.5$; $p=.752$) nor in any of the other ATT parameters between first-time mothers and mothers who already had children.

Discussion

Our results show that pregnancy in the third trimester was associated with a significant increase in ATT choices on the GeoCat instrument. While in a non-clinical adult population REL choices prevailed, with about two third of the population showing a predominantly REL result and about two thirds of the choices all over being REL (Brakel et al., 2002; Vanheule et al., 2011), pregnant women had in average 66% more ATT choices than controls. Moreover, some 40% of pregnant women had a "total ATT" protocol which is almost 4 times more than in the control population. In line with other studies using the GeoCat, pregnant women seem to share some characteristic dynamics of mental functioning also prevailing in the unconscious (Brakel et al., 2000) and in schizophrenia (Bazan et al., 2012). This concurs with the fact that in psychic transparency the unconscious is thought to be at the surface (Bydlowski, 2001), as it is thought to be in schizophrenia (Lacan, 1955–1956/1993, p. 11). In both these previous cases (unconscious, schizophrenia) we have interpreted this increase in ATT-choices on the GeoCat as an increase in primary process mentation, in line with the intended conceptual design of the

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instrument. We therefore propose to do the same in the present case, namely that pregnancy in the third trimester is associated with a significant increase in primary process mentation.

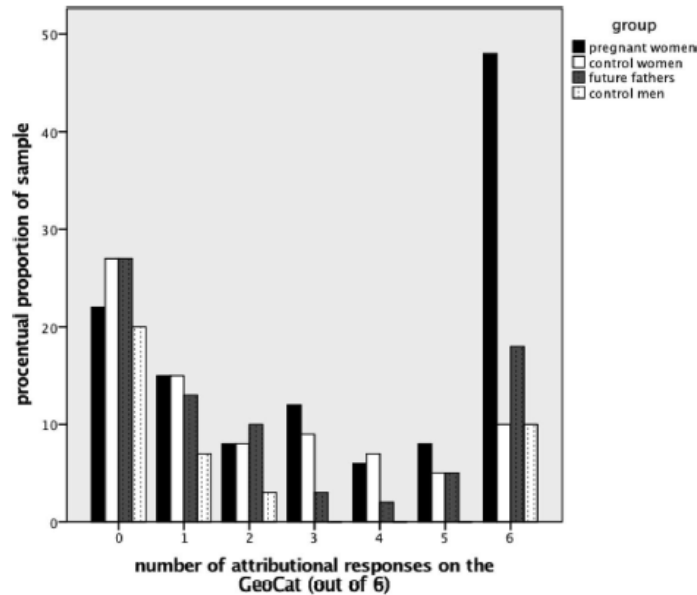


Figure 2. Histograms of attributional responses in pregnant women and control groups.

This interpretation fits with the clinical observations in pregnant women (see introduction), as parapraxes and slips and dreams are considered primary process phenomena by excellence in Freudian theory (Freud, 1900/1953, 1901/1978). The interpretation of an increase in primary process mentation in pregnancy also fits with a number of cognitive observations. In 2007, a meta-analysis of 14 studies (Henry & Rendell, 2007) reported that pregnant women perform worse than control on working (short-term) memory and free recall tasks, that is, selectively on “memory measures that place relatively high demands on executive cognitive control” (p. 793). Previously, we proposed a parallel between executive control and Ego-functioning (Bazan, 2007a, 2007b; Bazan et al., 2012) as have also others (e.g. Kaplan-Solms & Solms, 2000; Solms, 2004). As Freud (1895/1950, pp. 326-7) indicated that a good functioning of the Ego is a condition for secondary process mentation, a shift from secondary to primary process is thought to affect performance on executive tasks,

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such as is indeed often observed in pregnant women (for review, see Henry & Rendell, 2007). Moreover, Farrar, Tuffnell, Neill, Scally, and Marchall (2014) showed a decline in spatial cognition memory in pregnant women compared to controls. This fits with our proposal (Bazan, 2007a, 2007b) that secondary process mentation is correlative to the dorsal “Where?” pathway in the neocortex, which essentially situates the subject’s intention in relation to the world; it also fits with the idea that secondary process is the one process which gives access to spatial distinctions, while the primary process is characterized by temporal and spatial confusion (e.g. Kapsambelis, 2005). For all these reasons, we are confident in interpreting our shift towards ATT choices on the GeoCat, as indicative for a shift towards primary process mentation in pregnancy.

Table 2
Attributional Responses on the GeoCat in Pregnant Women as Compared to Three Control Groups

Group	N	M ± SEM ^a	Mdn/Mode ^a	%ATT > REL ^b	%6ATT ^c	IASTA-Y1 ^d	IASTA-Y2 ^d
Pregnant women	119	3.5 ± .2 ^{e,f,g}	4/6	52.1 ^{e,f,g}	40.3 ^{e,f,g}	39.4 ± 1.3 ^{e,f,g}	42.4 ± 1.0 ^{f,g}
Control women	81	2.1 ± .2	1/0	27.2	12.3	35.1 ± 1.4 ^f	40.8 ± 1.0 ^{f,g}
Future fathers	78	2.4 ± .3	1/0	32.1	23.1	29.7 ± 1.4	35.9 ± 1.4
Control men	40	1.8 ± .3	.5/0	25.0	25.0	31.7 ± 1.9	37.0 ± 1.9

Note. ATT = attributional; REL = relational; IASTA-Y1 = l’Inventaire d’Anxiété Situationelle et de Trait d’Anxiété–state anxiety (French version of the State–Trait Anxiety Inventory); IASTA-Y2 = l’Inventaire d’Anxiété Situationelle et de Trait d’Anxiété–trait anxiety (French version of the State–Trait Anxiety Inventory).

^a Out of a possible maximum of six ATT responses. ^b Proportion of population with more ATT than REL responses (i.e., four, five, or six ATTS answers; %ATT > REL). ^c Proportion with six ATT responses. ^d M (±SEM) of self-reports. *p* < .05 significantly different from ^e control women, ^f future fathers, and ^g respectively control men.

Interestingly, Grimm (1961) uses five cards of the Thematic Apperception Test to construct an ad-hoc stress index, which is mainly based on the average-to-“gloomy” interpretation of a few selected cards.

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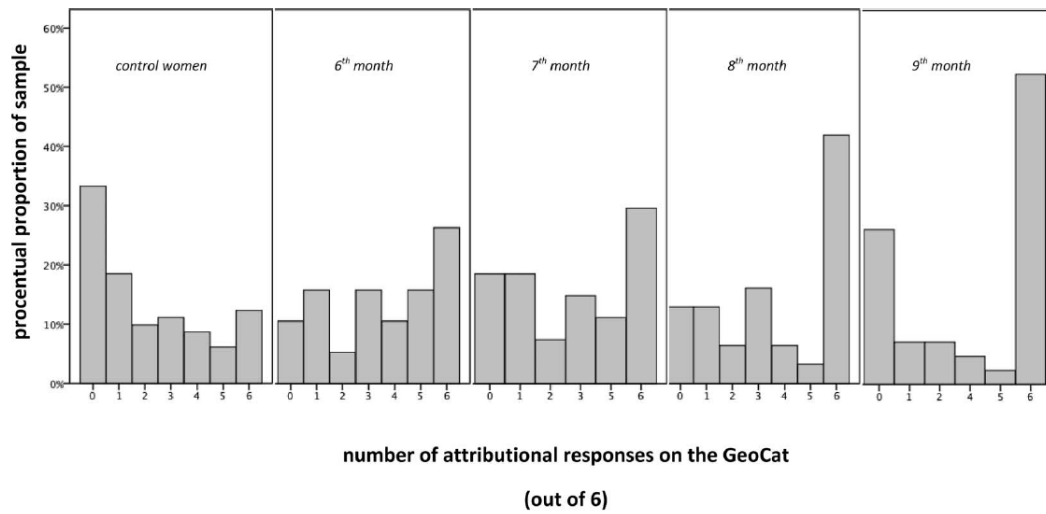


Figure 3. Histograms of attributional responses on the GeoCat in control women and in pregnant women in function of the month of pregnancy (sixth to ninth month).

For example, on card 13MF, a young man is standing in the foreground with his arm over his eyes while in the background a woman is lying half-naked in a bed with her arms falling down. Referring to illness, sexual intercourse or an everyday scene is considered “normal” and gets a score of zero, while referring to the themes of death, murder or rape, is given a score of one. In a sample of 200 pregnant women, Grimm (1961) thereby shows that this stress index is significantly higher in the third trimester of pregnancy. Even if Grimm calls his ad-hoc index a stress index, it is not directly measuring stress, but rather it is probing mental life, showing that in pregnant women the psyche is more easily preoccupied with (fundamental) fantasies, characteristic of primary process mentation. We take these results, therefore, as going in the same direction as the present ones. Our results seem in contradiction with Bellion (2001) and Oriol et al. (2016). Bellion’s (2001, $N = 13$) results of “restrictive and inhibited protocols” (p. 75) are interpreted as testifying of a REL disinvestment, in line with the attentional shift that would parallel psychic transparency (Bydlowski & Golse, 2001). Also, in line with Picco (2005), they show an important investment in mental work, particularly in preparation of the impending loss (with delivery). Oriol et al. (2016;

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N=7) report no evidence for the concept of psychic transparency in pregnant women. A major difference between these studies and the present one is the fact that our measure is formal in nature, and thus requires no content interpretation⁴. For example, in the Bellion (2001) study, content interpretation shows a high investment in putting barriers “to reinforce the limits between inside and outside” (p. 74) and this is, for example, based on the comment on the first image of the Rorschach (“a snail with its shell”), which on a formal level rather testifies of primary process associativity. The description of the results by the wordings of “rigid”, “avoidance” and “barrier” might thus sometimes misleadingly be considered as indicative of secondary process mentation, while the associative and sometimes “crude” (Bellion, 2001, p. 79) language of the expressions, thus interpreted, rather points to primary process mentation. Concerning the Oriol study, there was no formal interpretation grid (as there is for the projective tools) and interpretation was a (scaled) subjective belief that the woman talking was pregnant or not. The GeoCat by implying no hint whatsoever to pregnancy (the question asked is one of geometrical categorisation), probably obviates cognitive or defensive corrections and has a more direct access to the prevailing mental processes. This difference might also be at play in the Bellion (2001), study where the free interviews show a rich speech “of a great lability, of a facility of expression both of affects and representations” (p. 77) whereas the responses on the projective tests “elicited greater inhibition and restriction of affects”

⁴ Of course, nothing goes without interpretation and no data speak for themselves transparently. However, it is proposed that there is a distinction between formal and content interpretation: formal interpretation does not require to go through the singularity of the user to propose an equivalence between two forms while content interpretation needs such a contribution to a small or larger extent. Here, once we have agreed on the validity of the GeoCat, attributional responses are supposed to probe primary processes and relational responses secondary processes.

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and “an important decrease in creativity” (p.72). This, then, would suggest that secondary process defenses can be summoned when threat is perceived (and possibly in a “drastic” – Bellion, 2001, p. 78 – or more rigid way⁵) but that, when guards are down, primary process mentation is particularly prevailing in pregnancy.

We did not find significant differences between the sixth and the last month of pregnancy. Even if Bydlowski and Golse (2001) propose that the last month would rather coincide with the prenatal period of primary maternal preoccupation, as said before, this points to a difference in the content of the mental preoccupation – a shift of attention from topics related to the proper history towards the baby, and in the prenatal period especially towards delivery. From a formal point of view on the mental (transparency, associativity, lowering of defense), the second half of pregnancy, to the contrary, seems to form a continuous unit, which is what we also find here with an instrument that indeed is only able to probe for formal aspects of mental processing. To the contrary, if anything, primary process mentation increases with progress towards delivery. This then would be in line with Picco (2005), who proposes that “this ‘call for mental work’ [is] [...] particularly pressing at the approach of the delivery” (p. 23).

In past studies, we have also found increases in ATT choices, and thus primary process mentation, both in very (Brakel & Shevrin, 2015) and in clinically (De Gélas, Parrent, & Bazan, 2017) anxious adults. Our results show that our pregnant women tended to be slightly more situationally anxious than control women; this is in agreement with others (e.g. Heron et al., 2004; see Ross & McLean, 2006 for a systematic review). In our study, however, situational anxiety was not correlated to

⁵ Missonnier (2013, p. 62), in this context, says: “this singular suspension of repression condemns [pregnant women] to an exacerbation of their defensive shield”.

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the tendency to answer "ATT". In other words, if pregnant women are shifting towards primary process mentation, this can not be due to a difference in anxiety. The ATT-shift in pregnant women might also be related to some sample characteristics such as first language or level of education, but when we factored out these influences, we preserved a highly significant effect of pregnancy. Surprisingly, primiparity was also not associated with more primary process mentation as compared to pregnancies of a second or further child. However, these results do not preclude that the content of mental preoccupation varies with the pregnancy. For example, the French psychologist H el ene Riazuelo (2004) shows differences in psychological issues for first-time and second-time mothers. Primiparity solves an intergenerational debt, is associated with the desire to confirm the proper femininity and settles (pre-)oedipal wishes to get a child from the father. Pregnancy of a second child would presumably imply less confrontation with the uncanny. However, Riazuelo (2004, p.158) acknowledges that successive births can also cause rearrangements. Our results suggest that, on the formal level of the mental dynamics, no major differences are seen with the first as opposed to consequent pregnancies. Therefore we are drawn to think that the uncanny of having a strange being growing inside the proper body is imposing, each time again, a substantial demand for mental work and thereby inducing a shift in favor of primary process mentation – however, we can not contribute with this research as to the specificities of the content of that work. In line with these results, it has to be said that impending fathers, who presumably are also shaken as compared to a control population, did not show anything like the increase in attributional choices registered in impending mothers. The event nature of this radically unchallenged, "dramatic" situation of having another being growing inside your own body, cannot be trivialized. Picco (2005), for example,

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says: “the arrival of the child (...) requires additional psychic work. It is for these mothers to integrate the event” (p. 23). Bellion (2001) proposes that a major stake of this mental work is the processing of the unconscious aggressiveness induced by the presence of a foreign element inside the body, the fetus (for a recent perspective on maternal ambivalence, see also Raphael-Leff, 2010). Bydlowski (1997), indeed, indicates that it is this work, mobilizing a huge amount of mental energy, that dries up the mental sources needed to maintain usual censorship and defensiveness – which also suggests that defenses are considerably high consuming in mental energy. A woman who participated to the present study told us:

“I remember much more of my dreams. But I am not sure that this is because I dream more than usual. Instead, I have the feeling that it is because I sleep less profoundly, I rather doze and I wake up more frequently with the dream still right there. It's true, I do not sleep well since I'm pregnant, like my brain was too busy thinking about stuff but I do not really know about what.”

The distinction might be very correct: it is not the dreaming as such which has augmented, but it is the protective barrier between the dream and the conscious subject which has been weakened, leading to more dreams arriving at consciousness (see also Raphael-Leff, 1991; Ablon, 1994; Kennedy, Gardiner, Gay & Lee, 2007). Again, this would fit quite well with the idea that the mental energy required to maintain the defensive barrier has become scarce, as it is employed elsewhere at a more prominent mental task, symbolizing the event that someone is growing inside the own body.

We propose that the formal nature of our instrument actually fits well with the specificity of Bydlowski's concept. It might be precisely the avoidance of content interpretation by the GeoCat, which led to such clear-cut results, thereby contributing to taking a side in a debate: what is mentally specific to pregnancy is not structurally

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tied to a theme (a content) nor, a fortiori, to an affective result (joy, crisis, turmoil, pathology), but to a shift in mental dynamics – it is this shift which, depending on the singularity of the woman, will lead to the investment of specific themes, and thereby have singular effects on the affective state. Or said differently, our results contribute to the proposition that the one aspect of the mental specificity of pregnancy, which might be universalizable, is situated at the level of mental dynamics, i.e. at a formal level (as in contrast to a content or affect level).

This study does not exclude biological or hormonal explanations for the primary process dominance (e.g. Brett & Baxendale, 2001; Shetty & Pathak, 2002; Lurie et al., 2005). However, in the case of the memory deficits, for example, when the researchers compare memory test scores to the levels of six different hormones measured from blood plasma, no correlation is found (Henry & Rendell, 2007) – in other words, hormones may not be playing a direct role in these memory deficits. In any case, the actual existence of hormonal phenomena does not exclude the possibility of mental explanations. And even as it may be reassuring and sufficient for many women to attribute this impression of self-strangeness to a biological reason, it is also important not to reduce pregnant women to passive victims of their hormonal and biological state. This may be all the more true as the primary process mode mental activity, which mothers-to-be deploy, betrays their mental work in favor of attachment with the baby-to-come (see e.g. Picco, 2005; Cailleau, 2009) – for instance, by metaphorizing unconscious aggressiveness (Bellion, 2001). In an empirical study, Frank and colleagues (1994), for example, show a positive correlation between primary process levels in the future mother, measured on the Rorschach, and the later secure attachment of the child, in a sample of 25 women and their newborns. Interestingly, Janet Di Pietro and colleagues (2006) empirically

show that mild to moderate levels of psychological distress may enhance both motor and mental fetal maturation in healthy populations. We know from other research that anxiety favors primary process associations (see also Brakel & Shevrin, 2015; De Gélas et al., 2017) in a way, which is indicative of creative mental work⁶. Some other elements (Sit et al., 2006) suggest that a relative avoidance of primary process mentation, such as in obsessional neurosis, might be linked to a higher risk of puerperal psychosis. In other words, far from being a “normal illness”, the specific mental state of the pregnant woman can also be considered a sign of vitality and mental resilience.

Finally, the results of this research also further confirmed the validity of the GeoCat, an instrument designed in 2000 by Linda Brakel and her colleagues at the University of Michigan, and modified by Author’s Name at the *Université libre de Bruxelles* (ULB). Indeed, in agreement with a psychodynamic proposition of primary process dominance in pregnant as compared to control women, the GeoCat has once again proven to differentiate two populations accordingly in terms of ATT or REL choices.

Conclusion

In conclusion, using a simple non-linguistic instrument for the probing of primary and secondary processes, the GeoCat, we were able to show a substantial increase in primary process mentation in the last four months of pregnancy, as compared to future fathers, and to control women and men. This difference remained

⁶ For example, our newest result show that with increasing state anxiety in control populations there is less avoidance of phonological ambiguity in linguistic stimuli as well as more exploration of idiosyncratic associative links; however with increasing defensiveness, the inverse is seen with an avoidance of phonological ambiguity and a clear preference for conventional ‘dictionary-type’ associative links. This is in line with the idea of primary process as creative mental work.

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highly significant after factoring out the influence of confounding variables. Also, this increase was not different between women, giving birth for the first time, and women, having a second or further child. These results contribute evidence to the idea that it is the mere event of having another being growing inside your own body, which, by requiring huge mobilization of mental energy, dries up the mental sources required to maintain usual defenses. As a consequence, primary process mentation would be at work, resulting in a state, which has been qualified as “psychic transparency” by Bydlowski (2001). The mental explanation for this particular state of pregnant women is an alternative for a mere biological and deficit interpretation, and allows us to consider the function of this state as a sign of vitality and mental resilience, both for the mother-to-be and for the mother-infant bond.

Limitations and directions for future studies

There are clear limitations to the present study. First, an important question, given the present results is: when precisely does the predominance/rise in primary process mentation start? Concurrently, when or how long, after delivery, does it recede to control levels again? Our sample size was also not large enough to more thoroughly investigate the role of primiparity. Furthermore, though results were not significant, future fathers did show a tendency of increased primary process mentation when compared to control men. A new study with a larger sample of men could verify this observation and investigate what could explain this possible increase in men. Future studies could take two different directions. At the level of methodology, we are now exploring the use of other formal methods for the evaluation of primary and secondary processes (such as the use of rebuses, see e.g. Steinig, Bazan, Happe, Antonetti, & Shevrin, 2017); it might be interesting to see if the GeoCat results are replicated with these new linguistic methods. At the level of

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clinical relevance, one specific application might be in the domain of puerperal psychosis (e.g. Beetschen & Charvet, 1978; Mokrani et al., 2012): are women with a high level of (or with an early increase in) ATTs on the GeoCat more at risk to develop puerperal psychosis? Or is high investment in primary process mentation indicative of the type of mental work, which, to the contrary, will prove to be protective against later decompensation? These and other exciting questions seem to open up in the wake of the present research.

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