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# Mapping Visual Marginalia in Educational Contexts: A Model for New Types of Self-Regulation of Learning

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**Abstract:** Visual Marginalia (VM) are a common phenomenon in school, but they hold untapped potentials. We aim to understand their nature and role in learning and thinking. Marginalia are described as making annotations in book margins. In this paper, we extend this concept to include visual self-expressions such as para-writings and para-drawings, creative drawings and writings at the margin of books or notebooks, modification of book pictures, titles or texts, squiggling and doodling. VM are part of students' self-regulatory processes but are frowned upon by teachers. Thus, VM are *marginal* but also *marginalized*. We present a theoretical discussion of the topic, a new semiotic methodology that maps visual marginalia in a real classroom, and a model that reveals unstudied ways that students self-regulate.

## Visual Marginalia, visible thought in the margins

Marginalia are the production of graphical and textual elements in the margins of written texts. The Latin term "*marginalia"*, meaning "on the margin", refers to a praxis as old as books themselves and a way to overcome physical and temporal borders. Notes and drawings written in a book or manuscript (Jackson, 2001), allow authors and readers to challenge the text. Jackson (2001; 2010) and Golick (2004) identified two aims of marginalia. The first is a public use where authors of marginalia respond to significant works or to a historical accounting of social and cultural rituals by leaving messages for posterity. The second holds a private function where authors use marginalia to create self-awareness, "tracing the development of reader self-definition in and by relation to the text" (Jackson, 2010, p.10; McHatton & May, 2013). Our work led us to extend marginalia to visual marginalia (VM) in order to study their impact on cognition, motivation, emotions, and regulation of learning.

## Marginalia in the educational field: Visual Marginalia

According to social and cognitive constructivism, learners' thoughts and actions are influenced by external elements and by context (Hadwin & Oshige, 2011), but teachers tend to consider external elements in ontological isolation from context and culture. Science teachers typically downplay students' personal experience, artifacts and practices, positioning schooling as potentially disconnected from and not necessarily relevant to students' everyday lives and interests (Darling-Hammond et al. 2020). Yet, individual goals and self-efficacy influence motivation (Bandura,1999) and motivation and goals are expressed in collateral processes and productions (1). According to Reid (2018) marginalia are studied in the development of reading and writing skills with adults where a reader or student, relates to a written text to be understood, modified, or reflected on (Jackson, 2001; Stoddard, 2005). However, we are not aware of studies that consider marginalia as an expression of students' experience and emotional world while they are reading, listening and participating *in class*.

If Schott (2011) claims that marginalia are related to the prevailing state of mind of the author (2), VM 's definition (Dario & Tateo, in press) include the marginalia's author who is interacting in the educational context. Furthermore, VM include all collateral productions such as para-writings and para-drawings, creative drawings and writings at the margin of books or notebooks, modifications of book pictures, titles or texts, squiggling and doodling (the former being less organized and more unconscious), made by students in interaction with the lesson and *not* directly requested by the teacher. Thus, such products are both marginal and marginalized by teachers who may neglect their educational value. VM's main characteristics are as follows (Dario & Tateo, in press):

- They are collateral, literally "located at the margin of the lesson", of the printed book or hand-written notes. Depending on the type of cognitive-emotional involvement stemming from the context or from the lesson, VM assume different positions, locations and forms. First, they may have no relationship to the lesson. Second, they may relate both to the lesson text and the context of the lesson. Third, they may not be related to the lesson context, but reveal the cognitive-emotional state of the student. Thus, writing on the margins is a cognitive-emotional dialogue with the lesson text and context, in which internalization (e.g. thinking and memorizing) and externalization (structuring and expressing cognitive and emotional states) feed into one another (Vygotsky, 1997). VM play a role in structuring,

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understanding, articulating and extending individual experiences because these signs are manifestations of people's uniqueness in relation to socio-cultural context (Vygotsky, 1997).

- They are carried out on support using an exosomatic tool such as a pencil, a pen, or mouse on a screen. Tools change the nature and value of marginalia and Visual Marginalia.
- Marginalia embody affects, meaning they capture how a body acts when it is embedded in a collective that encompasses not just other individuals, but entangled material and discursive elements that constantly co-produce each other (Barad, 2007; MacLure, 2013). In addition, they can reduce tensions generated by negative emotions and be a relaxation strategy to foster learning, a tool for emotion awareness and emotion regulation (Polo, Lund, Platin & Niccolai, 2016).

In summary, marginalia have been studied in contexts where individuals read and annotate material on their own. Based on their marginalia, connections have been made to these readers' learning and thinking. However, in educational contexts where students are interacting in class with their peers and a teacher, there is a significant potential in developing more comprehensive theoretical and empirical approaches to grasp the role of Visual Marginalia in the teaching/learning process. We use a semiotic cultural psychology approach to study Visual Marginalia, to create a qualitative methodology to explore their phenomenology, and to propose a descriptive model that places VM within a two-axis space, from spontaneous to deliberate and from marginalized to normative, allowing us to discuss their impact in self-regulation (Järvelä, Hadwin, Malmberg, & Miller, 2018).

### A semiotic approach to marginalia

Educational phenomena are complex and a classroom is a sociocultural environment, providing meanings and resources for human beings to act and stabilize the world they experience through the semiotic mediation of sign-systems and systems of activity (Valsiner, 2007). Visual Marginalia are particular types of signs that play a role both in the internalization and in the externalization of meanings at school. Once meanings are internalized and the developing person has learned to master signs, they will be able to use them to externalize meanings back into social relationships. This process occurs through an active production of meanings by the developing person, in a constant negotiation between social interpretations and personal meaning-making.

Furthermore, the scaffolding role of drawing in the ontogenetic development of sign-mediated higher psychological functions is clearly acknowledged (Papandreou, 2014). It is thus reasonable that Visual Marginalia continue to play a role of external mediator in the elaboration of meaning in the course of development. The marginal spaces become the arena where students can elaborate meaning through the production of particular signs. However, in accordance with the developmental approach of cultural psychology of education, we must observe the process *in its making, in its historical unfolding*, in order to really grasp the developmental role of Visual Marginalia. Thus, Visual Marginalia are studied in their development and the methodology used allows us to "specify precisely both where the development happens and where interventions into development are located" (Valsiner & van der Veer, 2017, p. 152). This requires being able to capture the moving horizon of the developmental process, thus observing the production of Visual Marginalia in the classroom's ecological context.

Accordingly, we present our innovative methodology used to map Visual Marginalia in an authentic school context. Through interviews, we co-construct with the participants the development of their VM and the links with the lesson and the written or printed page. Our aim was to access the first-person subjective experience of students inside the classroom context. This gave us a window into how their emotions led to self-regulation.

## A qualitative methodology to study Visual Marginalia

### Study Design

To our knowledge, no study exists on VM in the classroom. We approach VM as a developmental process, through the perspectives of semiotic cultural psychology (Anderson & Larson, 2013) that respects phenomenological and interpretive epistemology (Giorgi et al., 1975). In other words, we aimed to describe the who, what, why, when and where of Visual Marginalia. We were also sensitive to personal meaning-making, considering the different voices involved in the process (e.g. students, teachers, and researchers). The protocol is based on a design that employs a teachers' questionnaire, video-recorded lessons (two for each class) and "auto-confrontation" interviews (Theureau, 2003; Clot, 2005). Due to the pandemic, the lesson was conducted at a distance for secondary schools, but face-to-face for primary schools.

#### Participants

Data came from three classes (42 students, 6-12 years; from primary (15 students, 7 males, 2nd grade; 12 students, 6 males, 5th grade) and secondary school (15 students, 7 males, 6$^{th}$ grade). All three teachers were female. Lessons

took place at *Istituto Comprensivo* in Northern Italy during the 2021 lockdown. Not all participants were Italian native speakers but all had been schooled in Italy for 4 years. No one had behavioral or learning difficulties. Each teacher and student participated voluntarily and parents authorized their children. Three students opted out.

## Materials/Tools

The tools used were the:

- Google Meet Platform where teachers and students interact, video-record lessons and conduct interviews;
- Interactive Whiteboard (IWB), where researchers interact with Primary School Students via the above;
- Wide-angle lens camera on the IWB to video-record face to face lessons at Primary School;
- Google Jamboard where students move a pointer on Visual Marginalia to explain how they made them.

## Procedure

- Phase 0: The researcher established a collaboration with the school and kick-off meetings were organized with the principal and the teachers who participated. Classes were identified and parental assent acquired.
- Phase 1: The teachers filled in a questionnaire on lesson organization: time, activities, task. A researcher gave teachers instructions on how to activate Google Meet and record the lesson. Primary school teachers activated Google Meet so a researcher could participate (cf. Figure1a). Classes in secondary school were virtual and the teacher, students, and researchers were connected through Google Meet (cf. Figure1b).
- Phase 2: The researcher re-informed students that their work would be recorded due to interest in their activities. No further information was provided. The video-recording was set for 40 minutes. Students were trained for 10 minutes on the presence of the camera. At the end, we asked the children to hand in any Visual Marginalia. Some VM were collected by screenshot within Google Meet by photo. Other students sent in photos of their VM with a smartphone. One author viewed all three classroom videos.

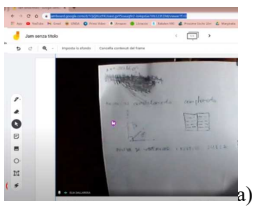
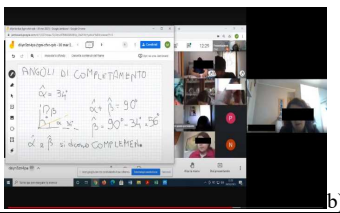
**Figure 1 (a,b)**
*The video-recorded lesson in the primary school is on the left (2a) and the secondary school lesson in the Google Meet Platform is on the right (2b).*


a)

b)

- Phase 3: Researchers carried out auto-confrontation interviews (15-20 minutes in Google Meet) where students revealed how they produced Visual Marginalia from start to finish. Interviews took place within two hours from the end of the recorded lesson and were conducted in parallel by a researcher and by two Master Degree students. The interviewer shared two screens. The first contained the student's marginalia (first column) and the second contained the lesson (third column). The student could move a pointer and explain the different phases of her elaboration (Table 1). Students are designated by "P" for pupil; "T" is for teacher, and "I" is for interviewer. Participants are numbered.

**Table 1**
*Example of Mapping the developmental Visual Marginalia productions during a lesson*

| | | | |
|---|---|---|---|
|  a) | P.1: "I meant to take notes and so, as instructed by the teacher, I made a complementary angle". |  b) | T1: "You have to write that alpha and beta are complementary". |

## Results and Interpretation

We give six canonical examples of Visual Marginalia (scribbling, ornaments, modifications of images, doodling, and drawing). Due to space and interest, we do not present labels or annotations. Interviews reveal how students produced VM. They all appear in Dario & Tateo (in press) and we discovered no new forms of VM. We illustrate how particular instances of Visual Marginalia have an impact on cognition, emotion, and self-regulation in the classroom. This allows us to propose an initial model that reveals unstudied ways that students self-regulate.

### Scribbling

This type of VM consists of lines and scrawls. It is positioned at the margin and it corresponds to a rapid movement of the student's hand and often only makes sense to the student at the end of the action. In Figure 2, the student says he is bored and unmotivated in math class and so continues to work on the art concept of *chiaroscuro*. In Figure 3, the student also recounts how she gradually attributed meaning to her scribble while doing it.

**Figure 2**

*A student during math class uses a scribble to reflect upon an art concept studied in the previous period*

1: How did you feel before you started scribbling?
P.31: Bored, I had finished the exercise and did not know what to do
I1: and how did scribbling make you feel?
P.31: less bored
I1: Do you also remember what you were thinking?
P.31: About the art lesson I had done earlier
I1: And why?
P.31: Because we had done the chiaroscuro and I wanted to see if I could do it
I1: So it is not connected to the arithmetic lesson but to that of art?
P.31: Yes
[…]
F: Was it born spontaneously or did you decide to make it with intention?
P.31: Spontaneously
I1: That is, did you find yourself doing it without thinking about it?
P.31 Yes

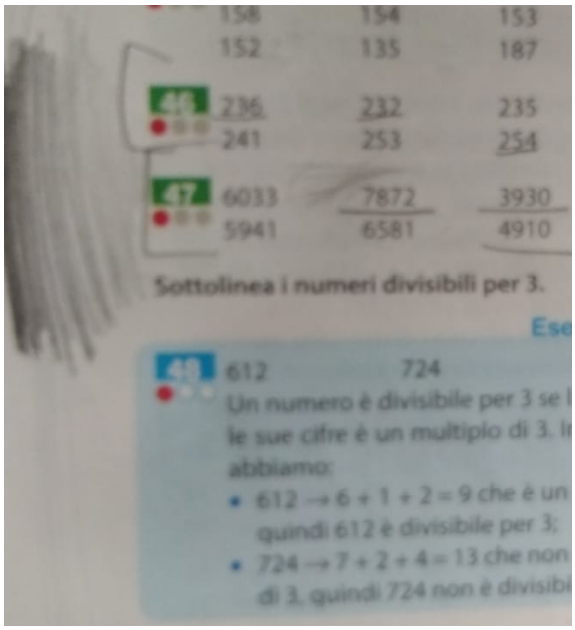
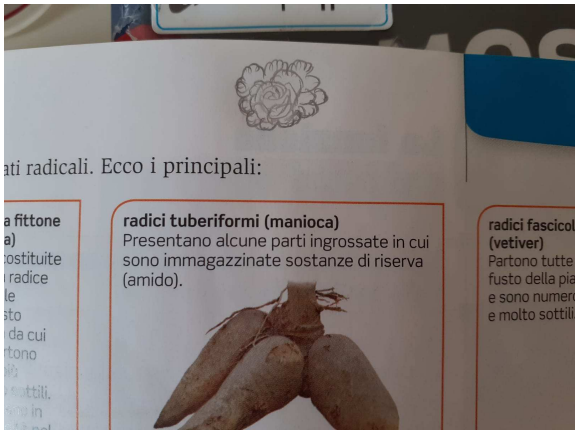



**Figure 3**

*In science class, a student uses a scribble of a flower to conceptualize a metaphor for inner and outer beauty*

I: Can you explain it to me?
P.40: There are two flowers, on the outside it is an ugly flower, while on the inside it is a rose that I tried to make look real
I: and what does it mean for you?
P.40: its meaning is not to judge from appearances but to see what that person is like from within, a butterfly is first a caterpillar and then becomes a butterfly
[…]
P.40: We were talking about plants
[…]
P.40: First, I did a scrawl then I realized that…It was a science lesson. I wanted to simply draw a flower because it was science time but then I thought I could draw a rose with a message of inner beauty



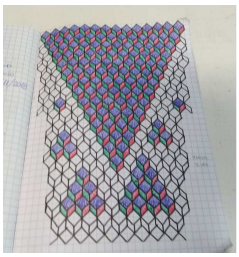

### Ornaments

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In this VM (cf. Figure 4) students repetitively produce the same simple form (e.g. flower, cube...) but there is a pattern. The student is concentrated on the lesson in the same way as for labels, and reproduces the same element. This particular example is from Dario & Tateo (in press).

**Figure 4**
*In middle school art class, this student produced this detailed ornament that helped her to concentrate*

I1 Then when you did this, did your emotion change?
P.2: Yes, I became calm. Let's say that I'm myself again...not because I have many other thoughts but boredom simply disappears and becomes concentration!
I1: Were you getting bored when you made it?
P.2: Yes, a little but it helped me reason and eliminate boredom.



## Modifications of images

In this VM, the student modifies the pictures that are printed in the book, for example by inserting decorative/drawn elements (e.g. moustaches, new clothes, noses, etc). In **Figure 5**, the student expresses a state of being connected with the context; he was laughing with his peers during the English lesson on actions. When a scene of happiness appears in a cartoon in the book page, he produces the marginalia, retracing the main characters' mouth and putting crosses on their eyes. In this manner, he creates his prevailing emotion: happiness.

**Figure 5**
*Pupil 25 modified the image on the right during an English lesson on actions to express his emotion*

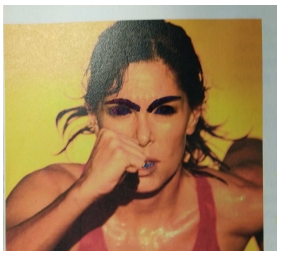
P.25: Yes, the things done with the red pen (.) I made the outlines of the mouths
I1: the crosses on the eyes
P.25: ((chuckle))
I1: I wanted to ask you why did you decide to do this?
P.25: Ehh ... because maybe I had seen some things in cartoons or things came to mind and made me laugh




A student may also use modification of images when he is angry and unmotivated. In **Figure 6**, the student had failed in the first class, and considered that his history teacher was responsible. Thus, during the lesson he often emphasizes his state of being.

**Figure 6**
*Participant 25 modified the picture during an English lesson on actions*

P.25 It depends if we are talking about history, in this case it is like if a war was taking place in my head and many times, I draw war pictures on the school images.
I1. What happens in the image?
P.25 "Well, if it is already in the book…maybe I change the character's eyes. I make him meaner. If he has a gun, I add a sword, so I give him a fighting spirit



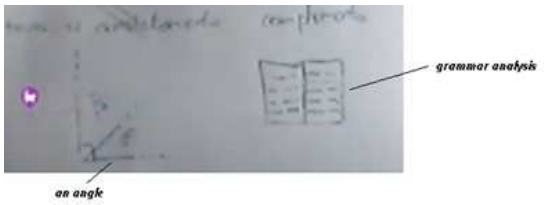
## A Doodling Medley

In a doodling medley, the student produces elements that do not have a meaning individually, but have a student-constructed collective meaning (cf. Figure 7). Here, the student thinks of the word "complement" in its mathematical context because two angles that add up to 90° are complementary angles. In addition, the dots on the end of the angle rays represent infinity. But, he also relates these two concepts (complement and dots) to Italian grammar. A sentence with a subject, verb, and complement, is complete, in a similar sense to completing

a 90° angle. Secondly, this student's grammar teacher also always forgot to dot the "i's" and the student was reminded of this when his math teacher said "Please, put the dots that I have forgotten on the sides of the angles".

**Figure 7**
*The student shares the value of marginalia as a tool to reflect on the language of math and grammar.*

P1: Here I thought of 'complement', a term used in the grammar analysis that I did with my primary school teacher
I2. "So, is there a relationship with what is happening here"?
P1. "Yup…the connection here is that the teacher said: "Remember to put the dots at the end of the sides of the angles" and so I remembered that my primary school teacher never dotted the "i's" and we used to say: "Teacher, the dots! "




## Drawing

Figure 8 shows realistic representations of a scene that condenses the teacher's lecture and page content. The drawing is done at the margin of a hand-written story. The student draws a picture as the teacher reads.

**Figure 8**
*The drawing done by a primary school student to sustain her comprehension and memory during the lesson.*

I1: Why did you choose to draw it?
P.8: because it was like the story the teacher read to us
I1: Did it help you understand the story better?
P.8: yes
I1: and what does it represent?
P.8: A little dog and a little girl playing together.
I1: Did the teacher ask you to draw it?
P.8: No, I felt like doing it



## A model for new types of self-regulation of learning

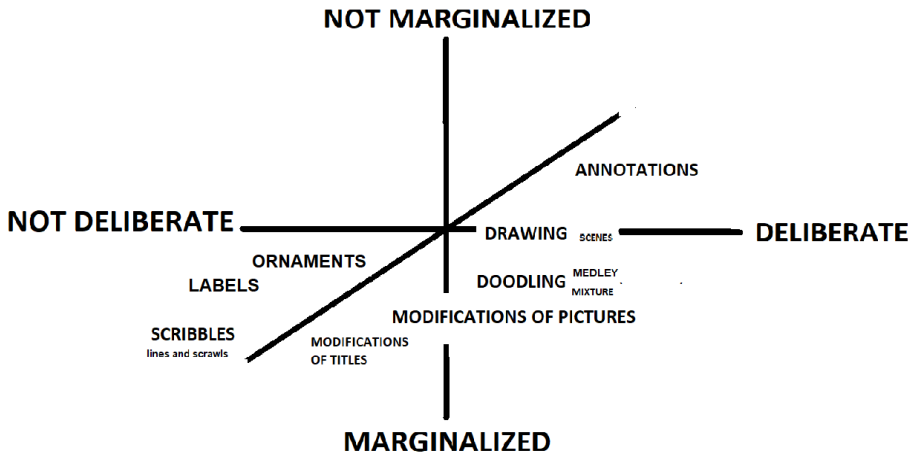
Our analysis allows us to generate an initial model that reveals unstudied ways of how students self-regulate in the classroom (cf. Figure 9). The correlation between the lesson and Visual Marginalia functions as an intermediate space of signification where the student relates his VM to the lesson and enhances the value of both. VM acquire value as they move from being spontaneous to deliberate. Specifically, if the students in our corpus find parts of the lesson boring, their Visual Marginalia are spontaneous products that take the form of scribbles, labels or ornaments, corresponding to automatic writings that the student produces when she has a pen in her hand. They help her to maintain attention during the lesson and awareness of the classroom around her, and limit inappropriate body movements (P.11 "At school I often end up drawing when theoretical subjects are being discussed and teachers could be distracted by my movements). VM can also be deliberate. Modifications of images, doodles and drawings are more deliberate forms and they sustain students' ability to explain, recall prior knowledge, information and experiences about a lesson (Andrade, 2010; Brown, 2014) as well as remember a printed text or their notes, and as we have seen, help students recognize their self-facilitation of understanding.

Often, students' VM change from a spontaneous, repetitive and hardly understandable form (squiggling, labels and ornaments) to a deliberate and meaningful one (drawing and annotations). That said, the entire trial and error process remains mainly marginalized (e.g. generally thought by teachers to be childish) and we argue that this is a missed opportunity. We present the diagonal line moving up to the right as a potential for creative productions. We have observed that students' unstructured drawing and writing (e.g. scribbles, loops or curls) has accompanied the generation of new concepts or creative productions. There is support for this idea from Winnicott (Berger, 1980) who discovered that when children play the squiggle Game, they manifest the necessity to start with a circular line before producing a new drawing.

Certain types of VM (scribbles, labels and ornaments) can also be an escape from stressful situations or they can contain the expression of feelings connected with the ongoing lesson. Thus, Visual Marginalia could reinforce an internal feeling or repress it. VM increase students' self-awareness of their feelings and their state of

being (See P.25 in Figure 5 and Figure 6) and their skill in recognizing and manifesting them. VM are an emotional regulator. When students feel unmotivated or disengaged, they draw and consequently they reduce their tendency to mind-wander while increasing their concentration.

**Figure 9**
*Visual Marginalia occur along two continua: spontaneous to deliberate and marginalized to not marginalized.*




In the case of doodling (mixture and medley), Visual Marginalia becomes a powerful tool in elaborating the learning experience when there is high-level content-based interaction (cf. Figure 9). Through the connections between elements, we can reconstruct the elaboration of student thought. When retrieving information immediately after the teacher's talk or reading, a student may have access to a highly active mental network and, according to Fletcher, van den Broek, & Arthur, (1996) meta-comprehension can be facilitated (Thiede et al., 2018). Doodles are multimodal summaries of knowledge at the margin without being time consuming practices.

## Conclusions

We illustrated the concept of Visual Marginalia, a ubiquitous phenomenon, to which little attention is paid in the educational field. We presented a qualitative methodology, implemented at two school levels in order to explore VM in an authentic teaching-learning context. We showed how video-recorded lessons and "*auto-confrontation*" interviews with students *revealed* how and why VM were produced during class, giving the interviewer insight into the reasons for emotions it produced, or what emotions caused it, and how these emotions were linked to the lesson. We then proposed a model illustrating heretofore unstudied ways in which students self-regulate.

In this sense, VM are not regressive and childish, but can be a valuable visual support for teachers to understand how students self-regulate their socio-cognitive-emotional processes. Given the visual nature of VM, our perspectives for teacher training modules include 1) STEAM (Science, Technologies, Engineering, Art and Mathematics), where art can be used to express scientific concepts and 2) collaborative settings, where students can use marginalia to engage in transactive discourses such as critique, challenges, and synthesis.

## Endnotes

(1) We use the term collateral to indicate all the processes at the margin or marginalized by teachers and students and that are considered to have little or no educational value.
(2) According to Schott (2011) doodles provide a window into the personality and the psychology of authors. They can be a symbol of mental disorders such as schizophrenia and they recall surrealist automatic drawings.

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