

eRubric : absolutely relative or relatively absolute? ... striking a balance in the assessment of student design work.

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As design educators, most would aim to provide clear, helpful, equitable feedback to students as they develop and refine their skills. Assessing the level of achievement in a design submission is somewhat tricky however. It is an inherently qualitative and comparative undertaking, relying on a set of relative values, and drawing on both the assessor's response as well as the particularities of the work itself. By contrast, many academic institutions require absolute measures of students' success, expressing this using an agreed range of values or grades. This translation can become area of some confusion, if not dissention, for students (Otswald and Williams, 2008).

The eRubric is a prototype interactive assessment tool, developed to investigate and to bridge the gap between an informed intuitive response and an absolute measure. The tool was initially conceived and designed by the author when working with groups of tutors from various disciplinary backgrounds to deliver a large cohort interdisciplinary design subject. The inherent values within the undertaking were soon apparent! (Tregloan and Missingham 2010).

During 2011, the eRubric was used by more than 40 design tutors to assess over 5000 student submissions. Tutors' experiences and responses were collected via survey and interview, and inform the further development of the tool. Initial findings are presented here. The eRubric continues to be developed with the support of the Faculty of Art Design & Architecture at Monash University, as well as the Faculty of Architecture, Building and Planning at the University of Melbourne.

This paper will present the operation of the eRubric tool, and findings to date. It will also discuss the development of effective rubric terms for design education, and opportunities offered by new interface formats to support clear and informed intuitive evaluation of design work.

Keywords :

Design Education; Assessment; Values; Informed Intuition; Creativity

Introduction

It is a challenging task to evaluate student work consistently and clearly. Most educational institutions call for the ranking of student success by absolute measures, on an agreed scale of values or grades. In such a case, the application of judgments, personally-held on the part of the assessor, or held within a larger 'professional' set and part of student acculturation, necessarily come into play. Where outcomes are ranked, such an undertaking is inherently comparative, asking assessors to consider student work in terms of other submissions within the group, as well as a set of 'expected' qualities and the values assigned to them.

Assessment of creative works pushes this challenge still further. In current writing on design and creativity, it is regular to see claims that there is no 'correct' answer, but that successful creative work should be both original and useful (Mayer, 1999) either in personal or historic terms (Boden, 2004). Further, it is noted that the engagement of the audience, and the particularities of a piece of work, are core elements of its 'success' (Gordon, 2004). At the same time, increasing cohort sizes mean that tutors' time per student is more limited, and there is a further call for consistency and quality assurance across a large number of assessors, sometimes from a variety of discipline backgrounds.

The eRubric prototype was developed to support and balance the following needs :

- Clear and shared understanding of the **bases for assessment**;
- **Constructive alignment** of project tasks and assessment foci;
- Written feedback to support **formative assessment** approaches;
- A culture and preference for assessors' **informed intuitive responses** to design projects;
- Institutions' management of and requirements for **absolute values** as assessment outcomes;
- **Efficient** use of tutors' time and resources.

The core question explored via the development of the eRubric interactive assessment tool, and a series of user interviews and surveys, can be expressed as: "*How do we assess the work of our students?*" An examination of this question brings forth several observations. Firstly, that '*we*' bring inherent values to our judgments of quality. Secondly, that '*the work*' our students produce varies widely, including projects that seek to explore both design process and / or product. These outcomes may be widely distributed around qualitative or quantitative foci, such foci both required and uncovered by work on a given project. Thirdly, we are reminded that this work belongs to '*students*' and as such its production and assessment sits within the frame of formal education, bringing into play a particular set of contexts, intentions and relationships.

Background

A number of the issues outlined above came to bear during the development and delivery of Designing Environments, a large, pre-disciplinary design subject at the University of Melbourne (Tregloan and Missingham, 2010). Although rubrics have been an accepted part of secondary school education for some time, and in a variety of disciplines within higher education (Reddy and Andrade, 2009), their use in the assessment of design at a tertiary level is relatively uncommon (Mueller, 2005). Rubrics were initially developed as part of the first delivery of the Designing Environments subject in 2008 to clarify the bases

of the assessment for tutors, particularly as a shifted focus from design outcome to process called on them to teach in a way they did not themselves learn. Early (spreadsheet-based) rubrics were helpful as a basis for moderation discussions, or equity reviews, of sample project marking from each studio group (around 20 groups of 16 students per semester).

In the following semester, the rubrics were also provided to students at the same time as project briefs. Student responses to quality of teaching surveys showed a marked improvement on measures of clarity of expectation and helpfulness of feedback, as well as overall satisfaction. The further development of course content, and the realignment of rubric terms with new learning tasks saw considerable further improvement in 2009. It is important to note that the design of an effective assessment approach, as well as the form of content delivery and management, was consistent with principles of good assessment and feedback design set out elsewhere (Nicol, 2007; Boud, 2010).

While students responded positively to the use of rubrics, tutors were less enthusiastic. Some complained that the process was time-consuming, and some that they struggled with the shift between an intuitive and reflexive response to creative work and an analytical consideration of boxes, words and percentage weighting. The eRubric prototype was developed as an exploration of, and response to, these issues.

Technology can support a wide range of activities within the assessment cycle, and a number of new applications with this aim are currently in development (Nicol, 2008). The eRubric offers an addition, building on a form of interaction between users and new interface components, to support appropriate engagement and effective provision of feedback to students. The experiences and opinions of tutors and subject / unit co-ordinators have been collected via survey and interview since early 2011. The use of the tool for various phases of an assessment cycle is set out below, alongside early findings.

Preparation of Assessment For Learning

Terms and Criteria

The eRubric does not define the wide range of values and expectations brought to an assessment process. It is instead intended to support the clear and overt communication of these values, and their relative importance for a given project, ideally within a course structure that also builds on those values and students' engagement with them. A key observation of the eRubric project to date is that such values clearly already exist, although they may not always be overtly communicated to students. They appear sometimes not even consciously considered by the assessor, emerging as a set of "different but tacit assumptions". (Husain and Waterfield (2006) in Elton (2006)) This may contribute to some confusion, and frustration on the part of current students as they seek to understand how their results reflect their efforts (Otswald and Williams, 2008).

The first element of the eRubric is therefore developed outside of the tool itself, and is perhaps the most challenging, the definition of the rubric terms themselves. There is considerable writing on the effective development of terms for assessment, and on the benefits or otherwise of assessing the student, the task outcome, or the skills or reflection demonstrated in the submission. (Elton, 2006; Nicol, 2007; Otswald, Williams and Asklund, 2010) The development of terms suitable for design assessment is an important issue and the subject of further exploration. The language developed for these terms must be carefully applied, to clarify for all stakeholders the bases for assessment, but particularly for creative works it must also take care to identify successful aspects of projects without limiting the outcomes of the projects themselves – a difficult balance.

A series of interviews conducted with design teaching staff at Monash University, and the University of Melbourne investigated approaches taken to the assessment of design work. These included conversations for the preparation of terms for the use of the eRubric, as well as more general discussions about the assessment of design work in particular units / subjects. Early reviews of these interviews find a broad range of values being applied, not always fitting neatly within either 'absolute' or 'relative' categories. In general, respondents described decisive opinions about what represented 'good design' and also more tempered responses, locating design success within the scope of the subject / unit under discussion.

These differing approaches were particularly apparent when design tutors (n=16) were surveyed with the question: *"In general, do you think student design projects should be able to receive a 'perfect' or 100% score? Have you ever given such a score? Why / Why not?"* The response was evenly split. Those that thought it should be possible generally expressed a view that such a score recognised exceptional accomplishment within the framework of the course delivery. Those in the other camp thought that it was not possible on more 'global' grounds, generally stating the view that there is always room for improvement in design.

It is proposed here that this split may be influenced by the broader view of the tutor as to the 'social construction' of a studio environment. While the lineage of many design studios draws on the art and craft tradition, relying on a strong, personal and effective relationship between 'master' and 'student', this is increasingly under threat as resources for such relationships and work practices decrease. In this situation, it has been suggested that it is important to be both clear and strategic with regards expectations of student learning), as well as the criteria for judgement (Dorst, 2006). We must also ask how this might be 'taught' without being teacher-centred. This is in place of an expectation that by passing through a number of studios a student will achieve an educational aim of professional enculturation by osmosis. Nevertheless, perhaps based on their own educational experiences, some tutors apparently still perceive their role as one of 'master', which surely has its appeal, and the studio as a 'mini-world' in which students experience a version of practice. Where a real-life studio must imitate an absolute model, there can be no perfection. The tutor's perception of the role is key here – as a representative of practice and the profession, or as an experienced practitioner engaged to teach particular aspects of design.

A challenging aspect of the development of criteria for the assessment of creative work is the definition of terms that can provide some direction to students, as well as flexibility for the evaluation of a wide range of outcomes. It was observed by one interviewee that there are a range of factors typically evaluated by design tutors, including the perceived quality of a project outcome with reference to the perceived 'difficulty' of the brief, the degree of development in a student's approach and engagement with aspects of process, and the degree of professionalism with which a project is completed and presented. In any or all of these cases, it is suggested here that the use of qualitative criteria is the most effective method for linking criteria to students' constructed understandings, noting that the project submission may be used as evidence to support this judgement, allowing each student to demonstrate a developing understanding of design and its production differently. Where criteria can be used to assist the alignment of constructed understandings with the learning focus for a given project, the opportunities for focussed teaching approaches can be further supported. (Biggs and Tang, 2007)

This first phase of the assessment process calls therefore for identification of the role of the subject / unit within a broader program, clear consideration of the values to be applied in assessment, and care in the expression of these. Useful approaches to the

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development of these have included the use of both text and spreadsheet programs, pens and paper, but most usefully thoughtful discussion.

Weighting + Value

After rubric terms are developed for a project they are recorded in the first part of the eRubric prototype, the eRubric Generator. This part of the system incorporates the names and weighting of the criteria, indicating their relative importance for the project, and terms relating these criteria to levels of achievement for the project in question. General information is also recorded, including the subject or unit name, the project name, the grading scheme (there are currently 3 options), and any late penalty conventions to be applied. Once this is complete, a Project DataFile is created and saved.

As above, the eRubric does not determine the content of these terms, however for the example provided below it can be noted that where assessment considers the demonstration of skill, specific criteria may relate to engagement with the task (process-focussed) or its performance (outcome-focussed) as in the 'tummyhead' example below. (The example skill being 'simultaneous head-patting and circular tummy-rubbing', as in the co-ordination game.) These terms can be provided to students as a pdf along with the project brief, serving as a support for the communication of the learning aims of a project. (Fig. 1)

	PARTICIPATION 15%	PERSEVERENCE 20%	ACCURACY 25%	PERFORMANCE 40%
H1	Student makes attempts with enthusiasm and encourages others to join in	Continued attempts and experimentation with the exercise after the basic	As H plus actions can be reversed or rhythm can be modified at will	Student has planned and executed a spectacle balancing technical skill and emotional content providing for the audience a novel and exciting experience
H	Student attempts the exercise with enthusiasm	Student perseveres in the face of difficulty	Head patting and tummy rubbing are performed at the same time and with a similar and steady rhythm in one direction	Performance is interesting and engaging for the audience
P	Student takes part in a lack lustre fashion or needs considerable encouragement to attempt the exercise	Student makes several attempts at the exercise	Both head patting and tummy rubbing are performed although there may be some stopping and starting of both	Performance is adequate and demonstrates the performers skill
N	Student refuses to participate or does so with a grumpy expression or negative words or noises	Makes minimal effort and gives up after limited or no attempts	Either head patting or tummy rubbing are not performed	Performance is lacklustre or uninteresting

Fig. 1 eRubric terms in the Generator for the 'Tummyhead' project, showing criteria and relative importance as weighting in vertical columns, combined with levels of proficiency relating to the grading scheme in horizontal rows.

Assessment Of Student Project Work

Sliders

The second major part of the tool is the eRubric Reader. This part of the tool can 'read' a Project DataFile created by the Generator and saved correctly. When the Reader is launched, and the project name and tutor identified, the Reader will then 'look for' the appropriate Project DataFile, combining this with a spreadsheet list of student details where this is also provided.

Within the eRubric Reader the rubric terms for the project are then presented with 'sliders' that can be moved on columns for each criteria. These sliders represent a tutor's assessment of the success of a project against the criteria specified. As the sliders move coloured overlays change to reflect the assessed level of achievement. Moving the slider up from a neutral central position turns the overlay a stronger green (for Go!), moving it down causes it to become darker orange (Danger!).

This form of operation allows the tutor to remain in a more 'responsive' frame when considering qualitative aspects of a design submission, while the tool performs the calculations in the background. This is consistent with the notion of 'connoisseurship' in the assessment of creative work as calling on refined perceptual ability, as well as experience and knowledge of its socio-economic context, for proper evaluation (Eisner 1975). The incorporation of sliders within the interface allows tutors to work on a spatial representation of judgement, supporting rather than interrupting this form of intuitive engagement with student work, and has been received very positively by tutors to date. The suitability of an 'unconscious' approach to complex value judgements is further supported by recent research (Dijksterhuis, Bos, Nordren, van Baaren, 2006).

The position of the slider along the scale, multiplied by the weighting of each of the criteria, determines the grade for the project shown on the screen. (Fig 2) In this way, the connection between a qualitative evaluation, and a quantitative measure is made, although the numeric grade is shown elsewhere.

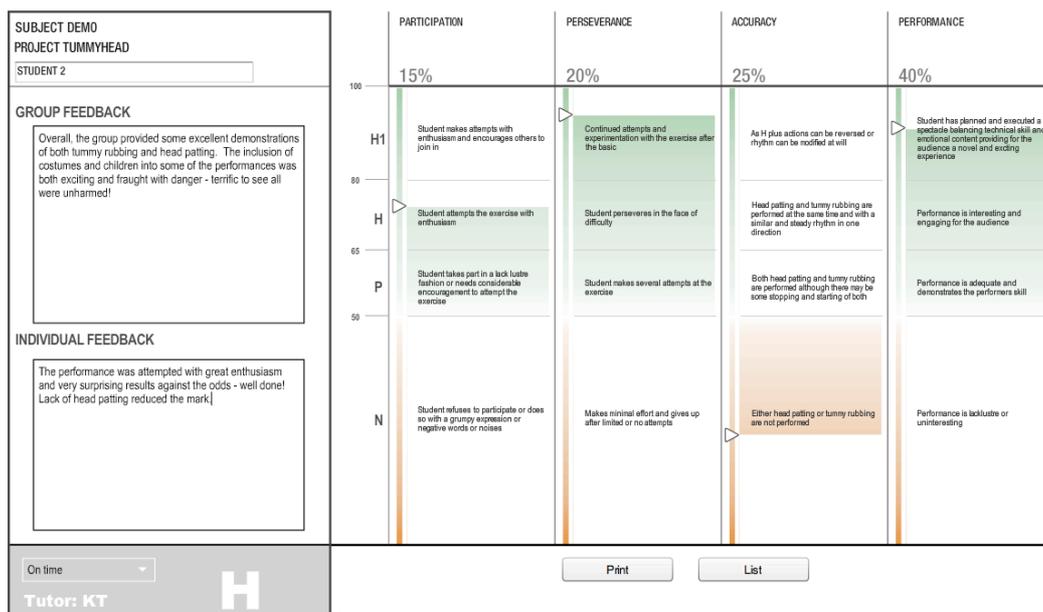


Fig. 2 Slider Screen in the eRubric Reader, showing sliders indicating assessed levels of performance for each criteria, Grade, and Group and Individual Feedback.

Group / Individual Comments

On the same Slider Screen, space is provided for Group Feedback to cover frequent responses or issues. This reduces repetition and tutor frustration, but also enables students to understand their work within the context of the larger group. The Group Feedback section is editable from any student's Slider Screen for the project, allowing it to be amended and refined as the tutor continues to assess submissions. Space for Individual Feedback allows a tutor to include more specific comments, or emphasize aspects of Group Feedback for attention. In both of these, connection to comments made in crit sessions or studio discussions can underpin the relationship of feedback and learning to the broader studio experience and environment.

Toward the bottom of the Slider Screen, a 'drop down' tab enables tutors to note any late submissions, in which case any defined late penalties are applied. When a tutor has completed the assessment of a submission, the 'list' button brings up the List Screen.

List Screen

Numeric marks are shown on a List Screen within the eRubric Reader, showing all students in the group, alongside coloured eRubric 'tiles' indicating the final slider position for each of the criteria, ranging from dark to light orange, then light to dark green. (Fig 3) This provides both an overview 'map' of the performance of the group, highlighting areas of learning (or perhaps assessment) that might need further investigation, as well as allowing a review of individual student results. Each student's Slider Screen can be accessed again from here, allowing for further adjustment if necessary.

One of the key features of the eRubric design is the separation of the numeric mark and slider screens. This is in response to an early tendency (particularly by inexperienced tutors) to attempt to 'match' the numeric mark to a result they were anticipating. In an interdisciplinary process-focused design subject, with a very different set of objectives and measures to those tutors had experienced in their own education, it was important to encourage a focus on the criteria rather than presupposed outcomes. In this way, for large cohort subjects, the eRubric becomes a teaching tool for tutors as well.

Student List - Saved onto disk

Student	Total	DaysLate	S	S	S	S
STUDENT 1	78	0	■	■	■	■
STUDENT 2	72	0	■	■	■	■
STUDENT 3	29	1	■	■	■	■
STUDENT 4	67	0	■	■	■	■
STUDENT 5	83	0	■	■	■	■
STUDENT 6	70	2	■	■	■	■
STUDENT 7	75	0	■	■	■	■
STUDENT 8	60	0	■	■	■	■

Fig. 3 List Screen in the eRubric Reader, showing student results as a numeric mark Total, days late, and colored 'tiles' indicating final slider positions for each criteria, providing an overall 'map' of the group.

The tutor moves between the Slider Screens for each student, and the summary List Screen for the project as project submissions are assessed. This activity saves a Tutor Data File for each project. The Tutor DataFile is updated as additional information is added eg. assessment via sliders, or additional feedback text. If assessment is interrupted, or completed in several sittings, relaunching the Reader for the same project and tutor will retrieve this information.

Moderation and Mark Finalisation

To review the equity of marking across a large cohort, or between more independent studios, a moderation process may be employed. In programs of different size this may be a more or less formal affair. For this phase, the overt identification of the criteria for assessment within the eRubric was seen as valuable in different ways for cohorts of differing size. For large classes with multiple tutors, the use of consistent criteria, while clearly not a foolproof method for consistency of marking, at least provided a clear basis for discussion during the moderation and finalisation of marks. The graphic representation of both sliders and tile map supported quick comparisons between both individual submissions and studio groups.

For smaller classes, the opportunity is perhaps more to illuminate differences between studios, although some have included including criteria that are applicable across a program (eg communication / representation skills). In this way, the terms of the criteria provide foci for discussion.

Feedback

Following a moderation process, and any further mark adjustment, the student Slider Screen is printed (hardcopy or pdf) and provided to the student as part of feedback. In studios, this has offered good opportunities for further discussion about both the aims and the assessment of a particular piece of work, as well as opportunities for improvement, as both sliders and tile map can be seen as diagnostic for both the individual student and the group. By identifying specific criteria and their weighting, even though they must be somewhat flexible to apply to designing, it is intended that students can understand more clearly the balancing of values undertaken by design assessors in the identification of a particular result. In this way, students may more clearly understand how different students may receive the same mark for very different reasons. As above, student engagement with this opportunity for formative feedback relies heavily on the development of relevant terms for both project and broader learning aims.

It has been noted that teaching staff on the whole have viewed rubrics as an evaluative tool, while students have found them useful to clarify the aims / intentions of a project. (Reddy 2009) The further opportunities for staff to engage with the teaching and learning aspects of rubrics are supported by survey findings in this project. As set out elsewhere, surveyed tutors have responded very favourably to the use of the eRubric to support fairness, equity and consistency in their marking (see Findings). Scores were more neutral (around the middle of the Likert scale) when tutors were asked whether they had been able to use the eRubric as part of their teaching approach. Tutors' responses were also neutral when asked to evaluate how useful students found the feedback, although students responded favourably to questions about clarity of expectations of them, and quality of feedback. Further work on the use of rubrics by tutors beyond their evaluative function may offer extended opportunities for teaching and learning, consistent with a constructive alignment approach.

Administration and Resources

Parallel with the qualitative feedback provided to students, final numeric student results can be output as a spreadsheet file using a 'send to excel' button. Results can be further adjusted to take account of Special Consideration or other factors if necessary, and incorporated into different formats for other institutional processes. Tutor DataFiles may be emailed to the subject co-ordinator for discussion, review or backup.

Once the prototype tool is properly installed and operating, tutors have made positive comments about perceived time-savings. The process moves quite fluidly, providing interfaces and outputs that respond to the needs of a wide range of stakeholders, including students, teaching staff, and institution. It can best support these needs when, as above, it can assist the incorporation of effective and relevant criteria into a strategic learning-focussed program, and the informed intuitive response of interested and engaged tutors.

Outcomes

Findings

The eRubric has been used in a number of design subjects of varying cohort size since its initial development in 2010. Data reported here relate to its use in 2 deliveries of 2 'large cohort' design subjects in 2011 (Subject A : 232 students in 2011, semester 1 (11s1); 131 students in 11s2; Subject B : 381 students in 11s1; 310 students in 11s2).

Data has been collected via a number of surveys. Surveys of subject co-ordinators prior to eRubric use included Subjects A/B (above) and other smaller subjects (n=4, average size 50 students). These focussed on key learning and teaching aims. Results of central university student Quality of Teaching surveys, taken late in both semesters, have been reviewed with regard to student experiences. These outcomes are not reported here, although some subject co-ordinator comments are included elsewhere in this paper.

41 tutors from Subjects A/B were surveyed in 2011 before their use of the eRubric, after initial uses, and at the end of both semesters (when more than 5000 student projects had been assessed using this system (11s1 + 11s2)). The anonymous surveys included both closed and open questions, and sought tutor opinions on the major roles and challenges of assessment in design projects, estimations of time taken for marking, quantitative and qualitative descriptions of 'good' design submissions, and awarding a 'perfect' score of 100% (noted elsewhere in this paper).

Tutors rated their experience of the use of the eRubric Reader in the assessment of student projects on a Likert Scale 1 – 5, where 1 = 'strongly agree' and 5 = 'strongly disagree'. Averaged scores were all low (indicating a positive response) with the exception of 'ease of printing feedback sheets' (receiving a neutral '3'), a technical challenge currently being explored. Tutors scored 'easy to use' most highly (1.6), followed by 'eRubric helped clarity' (1.8). Among other results, 'eRubric helped consistency' and 'eRubric helped good feedback' both scored well (2.1).

Tutors were asked to compare the use of the eRubric for assessment to their other previous experiences. A selection of typical comments is included below:

"Speeds up marking ... very strongly establishes marking expectations ... useful teaching tool especially submission requirements ..."

"Great to have a collective format ... helpful way of comparing marks / getting consistency ..."

"In comparison to the methods of marking used in the previous semesters - I taught (this subject) in 2 previous semesters - eRubric made marking much easier because it reduced repetition in copy/pasting feedback, it made it easier to compare different students' marks and moderate them across the studio. It also helped avoiding mistakes in calculations."

"Much easier to be consistent between students. Easier to compare marks between students as laid out and broken down. Great to have 'intuitive' scroll bar to initially gauge marks."

Subject co-ordinators for Subjects A/B, and for other units, have requested use of the eRubric in 2012.

Further Development

The eRubric has been developed to operate on both MACs and PCs less than 2 years old. The files are opened using web browsers (eg. Google Chrome or Mozilla Firefox), but are not currently hosted on-line. This is to protect student data security ie. files are currently as secure as other assessments stored on tutors' personal computers.

As it stands, the eRubric Reader, student lists and data files are all very small file sizes, and can be emailed or transferred using a USB drive or similar. Further development of the project will aim to make these files available for download from on-line sources, and investigate issues of compatibility with learning management systems, and increasing options for marking schemes and outputs. Further study of marking behaviour using the tool will investigate calibration options, and criteria development for design teaching. Funding is currently sought to develop the tool for use on mobile devices, eg. iPad etc., to allow its use in a variety of situations including studio crit sessions.

Conclusion

The eRubric system has potential application for a very wide range of situations where an intuitive response is the best form of engagement, and a connection between relative judgements and absolute measures is also required. The project has investigated and bridged a gap between qualitative assessments and quantitative measures by connecting the form of tutors' cognitive engagement with both assessment of creative projects and graphic-based computer interfaces. While its initial aim was to extend the learning opportunities for student designers, and to support equity and clarity in the assessment of creative works, it is also relevant to other educational contexts and disciplines, as well as other arenas.

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