

St Andrews Summer workshop 21-22. June 2018



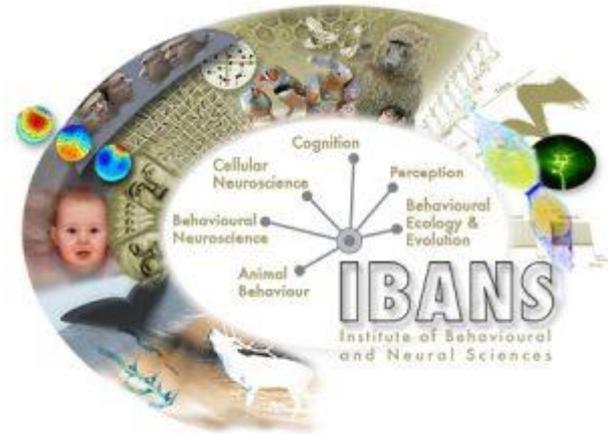
Association of Young Social Learning Researchers



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Acknowledgements

We would like to thank the generous sponsors for providing the financial means for holding this event, as well as the School of Biology of the University of St Andrews for providing the venue.



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St Andrews



Welcome to the 2nd edition of the Young Social Learning Researchers' (soon Early-career, ESLR) workshop!

As always, multidisciplinary is at the core of our workshop and we want this to be an opportunity for researchers of different disciplines to compare and merge their perspectives on how social learning is and can be studied, but also of what it brings to other closely related fields.

The theme at the core of this year's workshop, however, is change: change in social learning research, methods, directions and interpretative framework. Can we understand not just what the current trends in the field are, but where they are heading given applied and developing techniques and state-of-knowledge? Can we make predictions on future trends?

Finally, this is a workshop organised by a group of early-career researchers, for early-career researchers. We hope it will help build a network of peers for exchange of experience and advice, as well as for future research collaborations. So, there will be a lot of good ol' networking, but also pooling of shared issues in early career research and of possible (and achieved) solutions.

Enjoy – we hope there will be useful social learning going on.

The YSLR workshop organising team



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Program

Thursday, 21st June 2018

9:00-9:30 Registration and Coffee

9:30-9:45 Opening remarks

9:45-10:45 Keynote 1: **Eoin O’Sullivan**, University of Stirling. **“Searching for a psychological science of social learning in the 20th century’s schools of behaviour and cognition”**

10:45-11:15 **Ice-breaker**

11:15-12:30 Activity 1: **Social Learning across disciplines: Key influences**

12:15-13:30 Lunch, **Poster session**

13:30-14:45 Activity 2: **Social Learning across disciplines: Future directions**

14:30-15:15 Coffee, Poster session

15:15-16:30 Activity 3: **Studying Social Learning: techniques and methods**

16:30-18:00 **Open poster session** Cheese & Wine

18:30-22:30 Workshop dinner and social

Program

Friday, 22nd June 2018

9:00-10:00 Keynote 2: **Alexis Breen**, University of St Andrews. **“Social influences and consequences in animal construction”**

10:00-11:00 Activity 4: **Working cross-disciplinarily: group-based project proposal**

11:00-11:30 Coffee break, **Poster session**

11:30-12:30 Activity 5: **Issues in early-career research**

12:30-13:30 Lunch, **Poster session**

13:30-15:00 Activity 6: **Science communication: Explaining Social Learning on Wikipedia**

15:30-16:45 Senior researchers panel: **Learnt Perspectives - 20 years of Social Learning**
(Confirmed guests: Prof Malinda Carpenter, Prof Andrew Whiten, Dr Monica Tamariz, Dr Luke Rendell)

16:45-17:00 Closing remarks

17:00-17:30 ESLR AGM

Keynote speakers



Dr Eoin O'Sullivan. University of Stirling

“Searching for a psychological science of social learning in the 20th century’s schools of behaviour and cognition”

Thursday 21st June 09:45-10:45

The field of social learning research has a long history in psychology, beginning with Edward Thorndike’s early studies of dogs, cats, and chickens, and culminating in a modern, thriving, multi-disciplinary science. While the past 20 years has seen interest in the field surge, researchers are still largely guided by the theoretical schools of cognitive and behavioural science developed in the early and mid-20th century. Here, I will reflect upon how the cognitive, behaviourist, and ethological schools have guided my exploration of social learning mechanisms in human and nonhuman primates. Specifically, I will focus on how these perspectives have informed my approach to the ontogeny of imitative ability in children and capuchin monkeys. I will also expand on how lessons learned from these theoretical schools can guide future work in the science of social learning.



Alexis Breen (PhD Candidate). University of St. Andrews

“Social influences and consequences in animal construction”

Friday 22nd June 09:00-10:00

Many animals select raw material from the surrounding environment and manipulate it into a species-typical construction, such as a nest for occupancy. What role the social environment may play in shaping animal construction (such as the development of material handling, choice of material and/or construction competence) remains poorly understood. I will discuss recent laboratory work on nest construction by birds that explores several of these as-yet-unanswered questions, showing that the social environment can indeed impact animal construction.

Poster abstracts

Elisa Bandini. University of Birmingham/University of Tübingen

The role of social learning in chimpanzee tool-use is a well-established and thoroughly researched phenomenon. On the other hand, the individual learning capabilities of chimpanzees in relation to tool-use has, so far, been neglected. Yet the role of individual learning in the emergence of tool-use may have been underestimated. To test this hypothesis, three experiments on different wild chimpanzee stick tool-use behaviours (algae scooping, marrow picking and pestle pounding) were carried out on naïve, captive (or semi-wild) chimpanzees across testing institutions (from: Twycross zoo; UK, Il Bioparco di Roma, Italy and Chimfunshi Wildlife Sanctuary, Zambia). In all three studies, the naïve chimpanzees spontaneously reinnovated the same tool-use behavioural forms as their wild counterparts, without any social learning. These findings suggest that, as hypothesised, individual learning has a more important role in the emergence of tool-use behaviours than has been suggested in the field. Thus, whilst low fidelity social learning may facilitate the acquisition of tool-use behaviours, it is likely that it is not absolutely necessary for chimpanzee tool-use.

Marina Bazhydai. Lancaster University

Both pedagogical communication (direct eye contact and child-directed speech; Csibra & Gergely, 2009) and intentional but non-pedagogical communication result in learning in children (e.g., Gopnik & Schulz, 2004). However, less is known about transmission of information learnt in these two ways. Vredenburg, Kushnir and Casasola (2015) showed that 2-year-olds are more likely to demonstrate an action to an adult after learning it in a pedagogical than in a non-pedagogical context. Here we asked the question of whether and how pedagogical communication and action complexity interact to affect information transmission.

In Exp. 1, 24-month-old children ($N = 31$) interacted with two unfamiliar adults who demonstrated two actions. One demonstrator showed a simpler action in a non-pedagogical manner, while the other showed another, more complex action in a pedagogical manner. Afterwards, children were significantly more likely to demonstrate to a third experimenter the simple action first, even though it was presented without explicit pedagogical cues ($t(30) = -2.68, p < 0.01$), suggesting preferential transmission due to the ease of execution rather than pedagogical demonstration.

In Exp. 2 (N = 31), we attempted to replicate the results by Vredenburg et al (2015) to test whether pedagogical communication modulates information transmission in absence of other factors. We used the same procedure as in Exp 1, except that action complexity was matched for both pedagogically and non-pedagogically demonstrated actions in each trial. Children were equally likely to perform either the pedagogically or non-pedagogically demonstrated action first, both in simple and complex trials, thus producing a null result ($t(30) = .00, p = 1.0$).

We find no evidence for preferential transmission of pedagogically communicated actions, failing to replicate the results found by Vredenburg et al (2015). However, we do find evidence for preferential transmission of less complex actions, which may be the result of heightened saliency.

Anjali Bhatt. Stanford University

What explains cultural diversity in organizational settings? While research on organizational culture has made significant strides in understanding intra-organizational cultural processes, it has largely taken for granted the existence of variation in organizational culture across firms. In this paper, I develop a formal model to understand cultural variation among organizations as a function of cultural transmission both within and between firms. Bridging cultural processes like employee recruitment, socialization, and turnover with labor market mechanisms like employee migration between firms, the model conceptualizes individual employees as 'cultural carriers' that move between firms. Based on agent-based simulations of this model, I find that population-level dynamics like inter-firm migration have significant and surprising consequences for both cultural variation within and between firms. For example, sufficient employee migration between firms combined with minimal social learning by employees reduces cultural diversity even if firms attempt to hire for diversity. Importantly, the model validates the significance of and provides a basis for the study of inter-organizational cultural processes.

Kirsten Blakey. University of Stirling.

Title: The effect of others' different goals on children's strategic use of social information.

Experimental social learning paradigms are almost exclusively designed so that a demonstrator and participant are motivated to reach the same goal. However, in real life it is only in the minority of situations (such as during cooperation) that success for one person would be the same as success for another. Rather, adult humans actively seek, and strategically use, relevant social information about others' successes and failures to help them fulfil their own particular goals. Could this be a cognitive mechanism that develops differently in humans than in non-humans that may help to explain why cumulative culture appears to be unique to humans? In order to investigate this, the current study examines 3-7 year old children's ability to strategically use social information provided by a puppet who has a different goal to their own. Using the puppets acceptance or rejection of a capsule, selected from one of two possible reward locations, children must decide whether to select their capsule from the same or an alternative location. Results from this different goals condition will be compared to results from another condition in which children have the same goal as the puppet. We expect children to make successful strategic decisions about how to use social information when they have the same goal as the demonstrator at a younger age than when the demonstrator has a different goal. Data collection is ongoing, so it is expected that preliminary findings could be reported in this poster.

Dominik Deffner. Max Planck Institute for Evolutionary Anthropology

Title: "The Demographics of Culture: Evolution of Social Learning in Density-Regulated Populations"

Social learning and life history dynamics interact in human adaptation. Theoretical models of the evolution of social learning significantly advanced our understanding of the adaptive value of culture, but further progress is hindered by a poor appreciation of how demographic factors affect the action of natural selection on learning. Moving beyond such demography-free models and including more realistic life histories is required to better understand the integrated role of social learning in human evolution. Here, we present a simple model, which illustrates the effect of density-dependent population regulation on the adaptive value of culture. Unregulated populations grow exponentially and very soon approach infinite size. The way a population is regulated by density-dependent factors shapes the demographic structure of a population and may change the incentives to either copy or innovate.

Using analytical expressions and agent-based simulations, we found that population regulation profoundly influences the evolution of learning. In some situations, changing the regulation regime can even lead to a complete shift from individual to social learning or the other way around. Specifically, regulation through adult mortality leads to agents being born at times when adaptive knowledge is prevalent which tends to favor social learning, whereas, under fertility regulation, agents are more likely to learn right after changes in the environment when innovation is more likely to provide adaptive information.

This analysis suggests that progress in social learning theory requires the incorporations of more realistic life histories but also a better understanding of the demography of our ancestors.

Ahana Aurora Fernande¹ and Mirjam Knörschild ²

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2. Free University of Berlin; Smithsonian Tropical Research Institute, Panama; Museum für Naturkunde, Leibniz Institute for Evolution and Biodiversity Science, Germany

Title: Babbling bats: vocal repertoire ontogeny in the vocal learning *bat*, *Saccopteryx bilineata*

Human Language acquisition is characterized by several key features (e.g. vocal imitation, subsequent developmental speech stages) which are universal. Infant language development is composed of different stages, each determined by different characteristics, “canonical babbling” being probably the most prominent. Babbling is seen as a crucial step in language acquisition therefore, a comparative approach investigating non-human animals with a complex vocal repertoire regarding vocal ontogeny and possible babbling behaviour would be revealing. A promising species to investigate vocal ontogeny is the highly social bat species, *Saccopteryx bilineata*. This species is capable of vocal learning and owns a complex vocal repertoire (i.e. 24 distinct adult syllable types, combination of distinct syllable types into multisyllabic calls and two song types). The vocal repertoire is acquired by a conspicuous vocal practice in form of babbling bouts, reminiscent of the “canonical babbling” in human infants.

With our study we want to elucidate whether there are universal babbling characteristics among species with a complex vocal repertoire. During two consecutive field seasons we recorded and analyzed babbling behavior during pup ontogeny in two genetically different *S.bilineata* populations. To summarize the first results babbling behavior in *S.bilineata* is characterized by following features which are shared with the other babbling species: babbling bouts do not occur during a certain context (meaningless), they are dominated by repetitions (repetitiveness), they contain non adult forms (i.e. “transition” syllable type) leading to vocal overproduction and the acquisition of the adult syllable types does not follow a linear accumulative pattern (comparable to human infants).

Donna Kean. University of Stirling.

Title: You win, I win: monkeys copy successes more than failure

The ability to learn discriminatively from the successes and failures of others is integral to the capacity for cumulative culture. This ability has not been sufficiently tested in non-human primates and may help to explain the apparent lack of cumulative cultural evolution in their societies.

To investigate this, capuchin monkeys were tested in a visual discrimination task requiring copying of rewarded and avoidance of unrewarded behaviours. Thirteen monkeys housed at Edinburgh Zoo were trained to take part in a touchscreen stimulus selection task beginning with two-stimuli and progressing to three-stimuli discriminations. Subjects were either in the social condition where the experimenter performed an information trial (IT) by choosing between the available stimuli, or the individual condition where the subject performed the IT itself. The stimulus chosen at the IT was either rewarded or unrewarded, and was immediately followed by a test trial where subjects chose between the same stimuli. Repeating the selection made during rewarded ITs and selecting an alternative stimulus following an unrewarded IT were recorded as successful responses; all other responses were unsuccessful. No difference in performance was found between the social and individual conditions, however subjects were significantly more successful following a rewarded IT than unrewarded. In addition, subjects were found to copy with high fidelity (>80% success) following rewarded ITs, and to transfer this successful strategy from two- to three-stimuli discriminations.

Results suggest capuchin monkeys may learn better from successes compared to failures regardless of the source of information. Future research should compare humans tested on the same paradigm which may help explain subtle learning biases contributing to the cultural disparity between humans and non-human primates. This study also suggests that a new world monkey species can copy with high fidelity, further suggesting animal copying may be a question of context and not ability.

Nam Le. University College Dublin

Learning has been shown to be beneficial to the evolutionary process through the Baldwin Effect, especially when learning and evolution perform the same task. However, there has been little effort to investigate the interaction between lifetime learning and evolution when the learning task differs from the evolutionary task. Social learning, a form of learning in which an individual agent learns from others, has been displayed by various animals, including humans. Social learning is said to be the key of the transmission of behavioral traits both within and between generations via non-genetic means. Social learning has recently been studied in various disciplines, including Artificial Life and Cognitive Robotics, to see what adaptive advantage of social learning can achieve when coupled with individual learning. In this paper, we study how social learning benefits an evolutionary process when learning and evolution perform different tasks. We build a simulation of evolving neural networks in which learning is combined with evolution. The experimental result shows that social learning in combination with individual learning enhances the performance on evolutionary task better than individual learning and social learning alone.

Joshua Jordan Marsh. University of Dundee

Over-imitation refers to the tendency for children and adults to copy all actions demonstrated to them by a model, even if some of those actions are causally unnecessary to bring about the overall effect of the model's action sequence. Schachner and Carey (2013) suggest that children and adults over-imitate because they assume that unnecessary actions can be performed for their own sake – these actions therefore have “movement-based goals” (as in ritual movements, or dancing). In their paper Schachner and Carey (2013) determined that adults are more likely to infer movement-based goals for actions if these are arbitrary or inefficient towards an observed goal. However it has not yet been demonstrated that movement-based goals are inferred in classic over-imitation paradigms. Here we specifically tested whether adults and children are likely to infer movement-based goals when watching over-imitation tasks. Children and adults observed videos of over-imitation tasks used in previous studies (e.g. Horner & Whiten, 2005; Nielsen & Blank, 2011) and were asked to perform age-appropriate judgements on the goals of the models in the videos. Data will be collected and analysed using similar procedures to Schachner and Carey (2013). The results should be able to inform us whether over-imitation is indeed a product of movement-based goal inference.

Sabine Nöbel Université de Toulouse.

Social information use is a major fitness-affecting strategy of mate choice. It can be gathered by observing potential mates' sexual interactions. Mate-copying is a form of such socially learned mate-preference in which the fact of observing conspecifics' sexual interactions influences the future mate choice of an observer female. Mate-copying was found in many vertebrates, but only in one invertebrate (*Drosophila melanogaster*) using artificially colored males (green or pink). To test whether such social learning is conformist, we developed the hexagon device, where 6 observer females in a central arena watch 6 simultaneous demonstrations occurring in 6 peripheral compartments. There were 9 treatments with varying proportions of demonstrator females copulating with green or pink males: majorities of 6/6 (100%), 5/6 (83%), 4/6 (67%) and 3/5 (60%) for each color, plus one control (3/6: 50%). Observer females were then given the choice between 2 males, one of each color, and we recorded the color of the chosen male.

Control observer females did not build any mating preference, and situations where all 6 demonstrator females copulated with the same male color led to strong mate-copying. We found that observer females learned to prefer the most commonly chosen male phenotype whatever the level of majority for it during the demonstration (range of majority: 100% - 60%) and the efficiency of social learning was similar in the 4 situations that showed a majority for one color. Thus, mate-copying followed a step function with females learning equally well to prefer the most commonly chosen male color whatever the level of majority. This step function reveals surprisingly strong conformity in mate-copying. Conformity constitutes a major process of repair by which a population preference for a given male phenotype can persist over many transmission steps in which formerly observer females become demonstrators for a new set of observer females, and so on.

Murillo Pagnotta ■ University of St. Andrews.

The role of social learning in chimpanzee tool-use is a well-established and thoroughly researched phenomenon. On the other hand, the individual learning capabilities of chimpanzees in relation to tool-use has, so far, been neglected. Yet the role of individual learning in the emergence of tool-use may have been underestimated. To test this hypothesis, three experiments on different wild chimpanzee stick tool-use behaviours (algae scooping, marrow picking and pestle pounding) were carried out on naïve, captive (or semi-wild) chimpanzees across testing institutions (from: Twycross zoo; UK, Il Bioparco di Roma, Italy and Chimfunshi Wildlife Sanctuary, Zambia). In all three studies, the naïve chimpanzees spontaneously reinvented the same tool-use behavioural forms as their wild counterparts, without any social learning. These findings suggest that, as hypothesised, individual learning has a more important role in the emergence of tool-use behaviours than has been suggested in the field. Thus, whilst low fidelity social learning may facilitate the acquisition of tool-use behaviours, it is likely that it is not absolutely necessary for chimpanzee tool-use.

Julia Penndorf, Lucy Apli. Max Planck Institute for Ornithology, Radolfzell, Germany

Title:“Testing condition, but not age, is the main determinant of social learning : a meta-analysis”

Theoretical modelling has suggested that during the juvenile phase of an individual’s lifetime social learning from other individuals would be particularly adaptive, and that therefore there should be selection for increased social learning abilities during this developmental period. Although originally hypothesised for primates, this suggestion has since been expanded to other mammals, birds, and even reptiles. Yet relevant studies on are scarce and scattered in the literature, and there have been no conclusive outcomes of this research. Accordingly, we present here what we believe to be the first meta-analytic review of this body of work.

Eva Reindl. University of St. Andrews

The “cumulative culture puzzlebox” is not a culture-dependent task for children - In 2012, Dean, Kendal, Schapiro, Thierry and Laland (2012) published a seminal paper investigating the role of a series of socio-cognitive processes for cumulative cultural learning in young children. They presented groups of 3- and 4-year-olds with a three-stage puzzlebox and concluded that imitation, teaching and prosocial behaviour were necessary for children to solve the last stage of the box. The authors found that no child reached the final stage of the puzzlebox without some form of social support but did not test whether their task was beyond the reach of children working in isolation, a stronger test of whether cumulative cultural learning across individuals is required. We provide the missing asocial learning condition, showing that 9 out of 35 children tested individually could reach the last stage of the puzzlebox. As children in the Dean et al. social groups were more successful overall, compared to the asocial controls, the task remains valid as a simulation of the complexity of ratcheting tasks. However, as the Dean et al. puzzlebox is not as strongly culture-dependent for children as initially thought, the claimed role of imitation, teaching and prosociality for cumulative cultural learning warrants further testing.

Title: Selective social learning of plants, examining associability with disgust and edibility in 18 month-olds

In addition to a wide range of context biases, such as conformity and prestige (see Henrich & McElreath, 2003), research has begun to show bias in social learning for certain evolutionarily relevant content domains, such as animals and danger (Barrett & Broesch, 2012), and fear (Ohman & Mineka, 2001). For one particular domain, plants, it has been hypothesized that due to its fitness relevance there may be domain specific social learning strategies (Wertz & Wynn, 2014a). It has been shown that Infants defer to social cues for plants (Wertz & Wynn, 2014a), and preferentially associate edibility with plants compared to artefacts (Wertz & Wynn, 2014b). In the present study 18-month old infants will be split into three conditions, (i) in mouth action, (ii) behind hear action and (iii) disgust action, conditions (i) and (ii) being a direct replication of Wertz & Wynn (2014). In each condition, the participant will observe an actor taking a fruit off both a plant and a feature-matched control, and either putting the fruit to their mouth, putting it behind their ear, or exhibiting disgust. The infants are then given a choice as to whether they would like to eat the fruit from the plant, or from the control. It is predicted that, in accordance with the original study, infants will preferentially select the fruit from the plant in the “in mouth” condition, but not in the “behind ear” condition. And that infants will selectively avoid the fruit from the plant in the “disgust” condition, but not the “behind ear condition”.

Wataru Toyokawa. University of St. Andrews

Swarm intelligence – an emergent, accurate form of decision-making achieved through decentralised, distributed social interaction -- can be seen as one of the key advantages of grouping. However, in large groups the risk of maladaptive herding may also arise by a heavier reliance on conformist-biased social learning. We present a individual based computational model which suggests that the conflict between the ‘wisdom’ and ‘madness’ of interactive crowds is regulated by individuals selectively deploying different social learning strategies: swarm intelligence can be prominent when individuals possessed a weak conformity-bias, while the herding becomes dominant when individual conformity-bias becomes stronger

. Using an interactive web-based experiment with total 699 participants, we measured the patterns of human social information use with both increasing task difficulty and increasing group size. A hierarchical Bayesian statistical method revealed that conformity-bias (i.e., non-linearity of positive frequency-biased copying) increases with the task's uncertainty whereas the reliance on social learning (i.e., a probability to use social frequency information) increases with group size. As a result, the maladaptive herding occurred more frequently in larger groups engaging in more uncertain tasks. This is the first evidence that the conflict of swarm intelligence versus herding can be predicted from the strategic use of social information. Computational modelling and web-based experimentation may help bridge the gap between understanding individual cognitive processes and large-scale collective phenomena in a temporarily changing uncertain world.

Ryutaro Uchiyama. London School of Economics

Much research has focused on the positive relationship between sociality (e.g. social structure or group size) and brain size. One popular hypothesis, the Social Brain Hypothesis (SBH), posits that the primary selection pressure for increased cognitive complexity is tracking and managing social relationships in large groups. An alternative approach, the Cultural Brain Hypothesis (CBH), builds on cultural evolutionary theory and shifts the emphasis from “social” to “learning”. The CBH shares features with both the SBH and ecological hypotheses, but incorporates these features into a broader formal causal and explanatory framework. The CBH in broad strokes is that larger brains allow for the storage and management of more information, which can be acquired through asocial/individual learning or social learning. The relative reliance on these two strategies depends on other factors such as the number of conspecifics from which social learning can occur and life history parameters, which are in turn affected by reliance on these strategies, availability of information, and ecological factors. The CBH makes predictions about the relationships between these, and the specific conditions that lead to a take-off in brain size, culture, sociality, and an extended juvenile period characteristic of the last few million years of human evolution. Here we use the method of “phylogenetic path analysis” to evaluate conditional independencies in a data set compiled from the empirical literature. This method allows us to derive the causal structure that best explains the data using this method, and thereby test the CBH in a rigorous manner.

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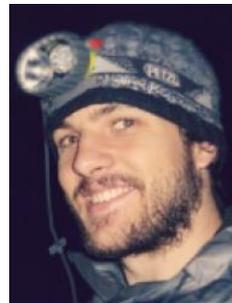
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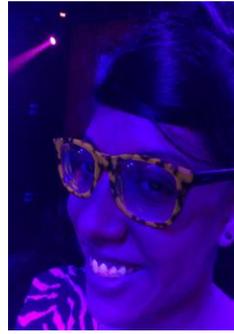


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