TURN SCANNING: EXPERIMENTAL AND THEORETICAL APPROACHES TO THE ROLE OF TURNS pdf

1: Mental Imagery (Stanford Encyclopedia of Philosophy)

Turn Scanning stitution of native-turn residues does not necessarily imply a pas-sive role for the turn. The native-turn sequence may in fact actively.

Your work will be shared with the class. Use normal font and margin size. Use the headings below. Such journals are usually published by university presses. You may be directed to a sample FRP. The real test here is not only locating and understanding a sophisticated piece of criticism, but capturing as much detail as space allows and saying something substantive about it as you think about its arguments in relation to your reading of the target text. Write in an authoritative and informed voice. It goes without saying that you will know the target novel well in order to evaluate the article. Use these headings in this order and provide the prescribed contents: Cite your source in proper MLA form. Provide any other information that will help someone locate your source independently. Make sure your citation is complete and correct. This will take only one or two lines. Take paragraphs to closely summarize the article. Be specific enough to show you have absorbed the critical evidence and the nature of the argument. Take paragraphs to establish the value and implications of this article and connect it to our course approach wherever possible. Write analytically as a scholar evaluating and applying the article to your own reading of the novel. Indicate what fresh perspective it offered. Identify the critical approach es used in the articleâ€”e. You can review these critical approaches in your introductory course textbook or English notes. Say how you might extend the argument further, identify additional textual evidence to support it or to qualify its conclusions which means to refine it or contest it in some selective and informed way. Write authoritatively as a critic yourself. Reading this article should suggest specific new avenues of research or lines of inquiry for you to pursue as you study the target novel. Use a few sentences to briefly explain what directions it points you in. For example, if it applies a critical method new to you, tell us what you would read to learn more about it. If it is grounded in cultural knowledge that is new to you, say what else you realize you need to research to understand the novel better. Be specific about the sources you would now target to continue your research. Ideally, you would cite specific follow-up sources. This is an example: This is the article that your going to be working with: In writing about the Holocaust and the Islamic Revolution in Iran, respectively, Spiegelman and Satrapi take on histories that have been formative for global politics in the past century. Fun Home confirms my commitment in An Archive of Feelings [] to queer perspectives on trauma that challenge the relation between the catastrophic and the everyday and that make public space for lives whose very ordinariness makes them historically meaningful. I write more as a specialist in queer studies than as one in graphic narrative, but I hope nonetheless to articulate how Bechdel uses this insurgent genre to provide a queer perspective that is missing from public discourse about both historical trauma and sexual politics. The recent success of graphic narrative, a hybrid or mixed-media genre, and also a relatively new and experimental one, within mainstream literary public spheres suggests that providing witness to intimate life puts pressure on standard genres and modes of public discourse. I seek to juxtapose Fun Home with other prominent graphic memoirs such as Maus and Persepolis to show how its queer sensibility extends their treatment of the relation between individual and historical experience, so central to secondgeneration witness, especially through a more pronounced focus on sexuality. Standing at the intersections of both contemporary LGBTQ culture and public discussions of historical trauma, Fun Home dares to claim historical significance and public space not only for a lesbian coming-out story but also for one that is tied to what some might see as shameful sexual histories. Even their brief explicit acknowledgment of a shared homosexuality just before his death is something of a missed encounter. It is this archival mode of witness that I want to explore in further detail. Taken by her father during a family vacation, the photograph of Roy lying supine on a motel bed, wearing only jockey shorts, his arms raised to expose his bare chest and his torso turned to face the camera, combines the conventions of pornography and the high-culture nude. The details that give it the historical qualities of a s snapshot are painstakingly reproduced-the square shape, the white border, the printed date mysteriously blotted out by her father. Using the powers of the graphic form to combine word and text, Bechdel both reproduces the visual evidence and engages in a discussion of what it means. Indeed, along with Alison, we might ask what kind of visual evidence the photograph offers. What, in other words, is wrong with this picture? Is it in itself incriminating because it represents an erotic gaze that is inappropriate? Does it gesture toward a sexual act that remains unwitnessed in the photo, providing circumstantial evidence of some possibly criminal form of behavior? Is the problem homosexuality? Or just the fact of secrecy? And, if the last, is her father responsible for the secrecy, or is it the product of his times? Its real significance lies in what it means to Bechdel looking at it from adulthood. Roy is gilded with morning seaside light. This image is of particular interest to those reading intertextually with Maus, in which Spiegelman strategically places three archival family photographs-a snapshot of the future artist, Artie, with his mother who committed suicide ; a photograph of the dead brother, Richieu, whom Artie never knew; and a studio portrait of his father in a concentration camp outfit taken shortly after his release from Auschwitz. In an important reading of these images, Marianne Hirsch suggests that, precisely because they are reproduced as copies rather than drawn, the photographs rupture the surrounding graphic text and hence become a sign of unassimilable memory , Her detailed and, by her own admission, even obsessional act of reproduction becomes a form of witness, made possible by a sustained attention to the object that reinforces her attachment to it. The style, however, is not photorealism. Despite their differences-the photograph instantaneous, the drawing laborious; the photograph apparently truthful, the drawing achieving other kinds of verisimilitude-both serve as technologies of memory. And it is not just as images but as material objects connected to lost pasts that they serve as the site of dense and often unprocessed feeling. She carries the responsibility of not continuing to closet him, even if revealing his questionable sexual behavior casts doubt not only on her own sexuality but also that of gay people more generally. Although, ultimately, Spiegelman and Satrapi also trouble easy moral categories: Mimicking her father as witness to the image, Alison is brought closer to him only at the risk of replicating his illicit sexual desires. Immediately before the image of the photograph of Roy, she describes their shared interest in the image of a young man posing in an Esquire magazine fashion spread-she wants the suit, while her father wants the boy, and in anticipation of the image to follow, there is another layered set of gazes as she holds the magazine and her father watches the image over her shoulder Bechdel , Indeed, photography is an integral part of her laborious process, since many of her drawings are based on actual photographs, some of them acquired through research and others made by posing herself in settings that she then draws. As adept with print sources as visual ones, Bechdel also lovingly reproduces pages of print text from both literary and handwritten sources, often blowing them up beyond their usual size so as to emphasize their material qualities and emotional meanings. The act of drawing itself thus becomes an act of witness, while also giving rise to a collection of emotionally charged documents and objects. Introduced to the genre by her father, who initially gives her an advertising calendar to write in, the diaries connect her to the high-culture literary world of Joyce, Proust, and other writers to which her father, the high school English teacher and frustrated artist, aspires, but they are also part of the culture of young girls in the s and s who did not necessarily think they were making art. The act of witnessing appears to break down as Alison is unable even to document the everyday events that are so frequently the subject of adolescent journals. The graphic act of striking out words with a mark that is a cross between word and image and which in turn makes the drawings of the text of the diary become as much image as word provides its own eloquent testimony to the impossibility of documenting truthfully what she is seeing or experiencing. It suggests the potential ordinariness of the unrepresentability that is the hallmark of some theories of trauma. Indeed, Alison often circles around her feelings or speculates about them at a distance. Like her father, whose lack of feeling for the corpses in his undertaking business leads him to show the young Alison a body in what she imagines to be an effort at vicarious feeling, she often turns to the activity of documentation in the absence of feeling. Equally important are the drawings of literary texts that become the vehicle for a dazzling array of intertextual references that pervade Fun Home and, by orienting it towards high culture, have led to its critical and crossover success. Although space limitations prevent me from exploring this archive in detail, were I to do so I would want to link the high culture references to the equally dense proliferation of lesbian and feminist texts. For example, Alison refers to having been in New York as a young girl not long before the Stonewall riots but having no awareness of them until much later , suggesting that she is both part ofthat history and outside it. In representing the Bicentennial of , during which she and her family made one of the periodic trips to New York that appear to have given her father access to an overtly gay culture, she links the tall ships on the Hudson to another version of U. In asking about the relation between two generations of queerness, her own and that of her father, Bechdel also raises larger questions about histories of sexuality and their relation to national histories. Would this also prevent him from being a lover of young boys or a suicide? Is the book calling for the social or structural changes that might make history work itself out differently? Bechdel offers no simple answers to these questions, thus avoiding the pieties that can sometimes accompany a cultural politics of witnessing that would encourage us to sympathize with her father as a victim of history whose problems could be solved by our retrospective enlightenment. A narrative of injustice, sexual shame and fear, of life considered expendable. Moreover, he might have avoided suicide only to become a member of the generation of gay men affected by the AIDS crisis that emerges in the years immediately following his death. She is willing to claim her father for herself and hence for history, insisting that his story be incorporated into a more fully historicized present but also that its unassimilability be acknowledged in order to problematize the present. In doing so, she embraces a queer temporality, one that refuses narratives of progress. Bechdel makes the interesting move of claiming a paternal lineage for a generation of lesbian feminism more commonly known for its embrace of a matriarchy and also connects it to a version of homosexuality that might seem the anathema of her generation. As second-generation narratives that explore the legacy of catastrophic events across time, all three narratives understand how as Hillary Chute also points out history makes itself manifest in ordinary life, in the endlessly petty complaints of a Holocaust survivor father, in the dress codes of young Iranian schoolgirls, in the restoration of a rural Pennsylvania home. It is important to understand these graphic narratives not just as efforts to explore the personal effects of history; they also use ordinary experience as an opening onto revisionist histories that avoid the emotional simplifications that can sometimes accompany representations of even the most unassimilable historical traumas. Like these authors, Bechdel refuses easy distinctions between heroes and perpetrators, but doing so via a figure who represents a highly stigmatized sexuality is a bold move. I find her willingness to represent her father with compassion and complexity particularly poignant in the current moment when not only a general public but LGBTQ cultures are quite willing to disavow stigmatized identities that might disrupt the clean wholesome image of gay people who just want to get married and have families. Those of us who resist this direction for LGBTQ politics have had a hard time making ourselves seen or heard in a public sphere that has been dominated by calls for and against gay marriage, but Bechdel sidesteps this debate in favor of a different form of visibility. She follows a close-up of the truck that killed her father linking him to the falling Icarus with one of her father, in the position now of Daedalus, catching her in the pool as a child. Reversing time and inverting roles in a fantasy that makes him the paternal protector, Bechdel ends with the possibility of rewriting history, including the canon of male literary heroes that her text continually invokes. With this messy story of a father who is neither hero nor victim, crafted from an aesthetic power that is also linked to compulsions both psychic and sexual, Bechdel keeps history indeterminate. Perhaps we can look to graphic narrative and other new genres of public feeling that shape personal witness into historical commentary to renew both queer politics and public cultures. See Trauma and Unclaimed Experience See An Archive of Feelings for a discussion of this work and the use of invented archives by lesbian cultural producers Cvetkovich I would also compare Bechdel to visual artist Nicole Eisenman, who combines references to Picasso and many other canonical artists with lesbian popular culture, often using a cartoonish style. For other important work on queer temporalities, and especially the reclamation of failed or perverse histories, see Dinshaw forthcoming, , Love , and Nealon These are all in the genre of solo performance, which I would link to the graphic narrative as another insurgent form of memoir that makes personal experience historical. Translated by Harry Zohn. The Power of Mourning and Violence. Johns Hopkins University Press.

TURN SCANNING: EXPERIMENTAL AND THEORETICAL APPROACHES TO THE ROLE OF TURNS pdf

2: Theory and Observation in Science (Stanford Encyclopedia of Philosophy)

Turn scanning. Experimental and theoretical approaches to the role of turns. , although their roleâ€”especially forÎ²-turnsâ€”has been regarded as significant (i.e.,). What role, if.

This paper provides an overview on the current research in the multi-disciplinary research project Dialog, whose goal is to build a prototype dialog-enabled system for teaching to do mathematical proofs. We present the crucial sub-systems in our architecture: We present an interpretation method for mixed-language input consisting of informal and imprecise verbalization of mathematical content, and a proof manager that supports assertion-level automated theorem proving that is a crucial part of our domain reasoning module. Since little is known about the use of natural language in studentâ€"tutor dialogs about proofs, we conducted two dataâ€"collection experiments. Mathematics teachers were hired as tutors. The students were instructed to enter proof steps, rather than complete proofs, to encourage a dialogue with the system. Interpretation of informal input mixing natural language and formal expressions. The mathematical content in the dialog utterances is i verbalized to varying degree, resulting in a mixture of natural language and mathematical expressions, and ii presented informally and imprecisely. The language phenomena are by themselves not new, but the genre of an informal mathematical dialog adds new twists to them [6, 18]. The mixed language and the imprecision call for deep syntactic and semantic analysis to ensure a correct mapping of the surface input to the formal representation of the proof step. Evaluation of proof steps. In order to evaluate a proof contribution, a domain reasoner that supports the tutoring process must be capable of judging contextual appropriateness of proof-steps. Is the proof step logically and pedagogically useful given the goal? However, proof step evaluation with respect to granularity and relevance is a novel and interesting application challenge for theorem proving systems. To illustrate 1 2 K denotes the set complement. Here and further T and S denote tutor and student turns respectively. Wie geht es nun weiter? By distributivity we have: Was meinen Sie mit: Meinen Sie Element oder Teilmenge? Do you mean as element or subset? Meinten Sie vorhin wirklich: P denotes the powerset. From the point of view of linguistic analysis, S is unambiguous. The demo system consists of a graphical user interface, an input analyzer, a proof manager, a tutorial manager, and a natural language generator. The modules are connected and controlled by an Information State Updatebased dialogue manager [29]. For the other modules we provided baseline functionality required to carry out the dialogs. More details on the Dialog demo system can be found in [10]. The remainder of this paper is organized as follows: In Sections 2 and 3 we describe our approach to mixed language interpretation and proof step evaluation, respectively. In Section 4, we overview the related work. In Section 5, we summarize and present the conclusions. To ensure correct mapping to this representation, deep analysis is needed. In this section, we present an overview of our input interpretation procedure; we omit obvious pre-processing such as sentence- and word-tokenization. Then we discuss extensions for some of the more complex phenomena. For a more detailed discussion of language phenomena and interpretation procedure see [30, 31, 18, 19] 2. We shall use it to illustrate the step-wise analysis process that proceeds as follows: Natural Language Dialog with a Tutor System for Mathematical Proofs 5 During syntactic parsing, a domain-independent semantic representation is constructed. For the purpose of subsequent syntactic and semantic parsing, each mathematical expression is assigned a symbolic token corresponding to its type. The token representing the expression type is substituted for the original expression resulting in the following input to the parser: The parser processes sentences and syntactically well-formed fragments, and constructs a representation of their linguistic meaning LM. The LM is represented as a relational dependency structure closely corresponding to the tectogrammatical level in [26]. Our motivation for using this grammar framework is two-fold: Second, mathematical expressions, represented by their types, lend themselves to a perspicuous categorial treatment as follows: In the course of parsing, we treat symbolic tokens representing mathematical expressions on a par with lexical units. The LM representations built by the parser are domainindependent. The input structures are described in terms of tectogrammatical valency frames of lexemes that evoke a given concept. The output structures are the evoked concepts with roles indexed by tectogrammatical frame elements. For example, the Norm tectogrammatical relation TR evokes the concept of a Rule. The ontology is an intermediate 6 C. The motivation for using an intermediate representation instead of directly accessing a mathematical knowledge base will become clear when we discuss ambiguity in Section 2. Let us return to the example utterance: The right part of Fig. First, based on the semantic lexicon, the concept Assertion is assigned to hold, with Patient and Norm dependents as the Proposition and Rule respectively. The baseline processing described so far covers simple cases of the mixed language: However, our corpus contains more complex cases of interleaved mathematical expressions and natural language. We turn to their processing in the next section. In this section, we describe several extensions that we have implemented so far: Input utterances often contain incomplete mathematical formulas interleaved with natural language expressions, where these two modes interact, e. To handle these cases we made the following extensions: Example 2 illustrates a case of tight interaction between mathematical expressions and the surrounding natural language: To account for this interaction we identify substructures of mathematical expressions that may lie in the scope of a natural language expression. The relevant substructures are obtained by splitting the formula at the top node. As a result, we obtain two readings of the expression: This allows us to obtain the intended reading of 2. To handle such cases, we extended the domain model. The structural composition relation holds between a structured object and its structural sub-component in the substructure role. The semantic 8 C. The domain ontology and semantic lexicon are presented in more detail in [31, 19]. We have so far concentrated on a proof-of-concept implementation of the input interpretation components. Our interpretation module is capable of producing analyzes of utterances similar to the ones in Fig. We have implemented an OpenCCG grammar that covers variants of the syntactic structures of the utterances. Our focus so far has not been on robust coverage, but rather on a systematic consistent representation of the most frequent constructions in the format readable by the domain reasoner. Consider, for instance, utterance a in Fig. Soundness is, however, only one of the criteria along which a proof step should be evaluated in a tutorial context. For instance, a proof step may be formally relevant in purely logical terms, but considered irrelevant when additional tutorial aspects are taken into account. Example Student Utterances a From the assertions follows D. Proof step evaluation scenario: A1 - A4 are assertions that have been introduced in the discourse and that are available to prove the goal G. Well known examples are proof by induction on the naturals, proof by structural induction, and proof by diagonalization. Proof step evaluation should therefore support dynamic step-by-step analysis of the proof constructed by the student using the criteria of soundness, granularity and relevance not only with respect to a purely logical dimension, but also a tutorial dimension. So far we have mainly focused on the logical dimension; the hypothesis is that the solution in the logical dimension is a prerequisite for solving the proof step evaluation problem involving also the tutorial dimension. Much further research in this direction is clearly needed. In the following sections, we discuss some of the issues related to evaluating granularity and relevance. We illustrate the challenges using a constructed example in Fig. For instance, evaluation of a boils down to judging the complexity of the generated proof task P1. For example, the smallest ND proof for utterance a requires three proof steps: If we now 10 C. This threshold may be treated as a parameter determined by the tutorial setting. However, the ND calculus together with naive proof step counting does not always provide a cognitively adequate basis for granularity analysis. Solving logical relevance problem requires in this case checking whether a proof can still be generated in the new proof situation. In this case, the task is thus identical to P1. An irrelevant backward proof step, according to this criterion, is d since it reduces to the proof task: The challenge is to exclude detours and to take tutorial aspects into account in a tutorial setting we are often interested in teaching particular styles of proofs, particular proof methods, etc. Statistical methods are often employed in tutorial systems to compare student responses with pre-constructed gold-standard answers [15]. In our context, such a static modeling solution is impossible because of the wide quantitative and qualitative range of acceptable proofs, i. In this respect our approach is closely related to the Why2Atlas tutoring system [22]. This system presents students with qualitative physics Natural Language Dialog with a Tutor System for Mathematical Proofs 11 questions and encourages them to explain their answers with natural language. The system then employs propositional logic representations and propositional abductive reasoning to analyze the answer with respect to a set of anticipated solutions.

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3: Experimental and Theoretical approaches to cell mechanics

@MISC{Frieden_turnscanning: author = {Carl Frieden and Enoch S. Huang and Jay W. Ponder}, title = {Turn Scanning: Experimental and Theoretical Approaches to the Role of Turns}, year = {}} The mechanism that enables a protein to fold to its correct three-dimensional conformationâ€"given only the.

Each circle represents a "state" of the tableâ€"an "m-configuration" or "instruction". No general accepted format exists. Usually large tables are better left as tables Booth, p. They are more readily simulated by computer in tabular form Booth, p. Hill and Peterson p. Whether a drawing represents an improvement on its table must be decided by the reader for the particular context. See Finite state machine for more. The reader should again be cautioned that such diagrams represent a snapshot of their table frozen in time, not the course "trajectory" of a computation through time and space. While every time the busy beaver machine "runs" it will always follow the same state-trajectory, this is not true for the "copy" machine that can be provided with variable input "parameters". On the far right is the Turing "complete configuration" Kleene "situation", Hopcroftâ€"Ullman "instantaneous description" at each step. If the machine were to be stopped and cleared to blank both the "state register" and entire tape, these "configurations" could be used to rekindle a computation anywhere in its progress cf. Turing The Undecidable, pp. Models equivalent to the Turing machine model[edit] See also: Turing machine equivalents , Register machine , and Postâ€"Turing machine Many machines that might be thought to have more computational capability than a simple universal Turing machine can be shown to have no more power Hopcroft and Ullman p. They might compute faster, perhaps, or use less memory, or their instruction set might be smaller, but they cannot compute more powerfully i. Recall that the Churchâ€"Turing thesis hypothesizes this to be true for any kind of machine: A Turing machine is equivalent to a single-stack pushdown automaton PDA that has been made more flexible and concise by relaxing the last-in-first-out requirement of its stack. In addition, a Turing machine is also equivalent to a two-stack PDA with standard last-in-first-out semantics, by using one stack to model the right side and the other stack to model the left side of the Turing machine. At the other extreme, some very simple models turn out to be Turing-equivalent , i. Common equivalent models are the multi-tape Turing machine , multi-track Turing machine , machines with input and output, and the non-deterministic Turing machine NDTM as opposed to the deterministic Turing machine DTM for which the action table has at most one entry for each combination of symbol and state. For practical and didactical intentions the equivalent register machine can be used as a usual assembly programming language. An interesting question is whether the computation model represented by concrete programming languages is Turing equivalent. While the computation of a real computer is based on finite states and thus not capable to simulate a Turing machine, programming languages themselves do not necessarily have this limitation. For example, ANSI C is not Turing-equivalent, as all instantiations of ANSI C different instantiations are possible as the standard deliberately leaves certain behaviour undefined for legacy reasons imply a finite-space memory. This is because the size of memory reference data types is accessible inside the language. However, other programming languages like Pascal do not have this feature, which allows them to be Turing complete in principle. It is just Turing complete in principle, as memory allocation in a programming language is allowed to fail, which means the programming language can be Turing complete when ignoring failed memory allocations, but the compiled programs executable on a real computer cannot. Choice c-machines, oracle o-machines[edit] Early in his paper Turing makes a distinction between an "automatic machine"â€"its "motion When such a machine reaches one of these ambiguous configurations, it cannot go on until some arbitrary choice has been made by an external operator. This would be the case if we were using machines to deal with axiomatic systems. He "suppose[s] that the choices are always between two possibilities 0 and 1. Each proof will then be determined by a sequence of choices i1, i2, The automatic machine carries out successively proof 1, proof 2, proof 3, An oracle machine or o-machine is a Turing a-machine that pauses its computation at state "o" while, to complete its calculation, it "awaits the decision" of "the oracle"â€”an unspecified entity "apart from saying that it cannot be a machine" Turing , The Undecidable, p. It is possible to invent a single machine which can be used to compute any computable sequence. If this machine U is supplied with the tape on the beginning of which is written the string of quintuples separated by semicolons of some computing machine M, then U will compute the same sequence as M. This finding is now taken for granted, but at the time it was considered astonishing. The model of computation that Turing called his "universal machine"â€”"U" for shortâ€"is considered by some cf. Davis to have been the fundamental theoretical breakthrough that led to the notion of the stored-program computer. This result was obtained in by F. Arora and Barak, , theorem 1. What is neglected in this statement is that, because a real machine can only have a finite number of configurations, this "real machine" is really nothing but a linear bounded automaton. On the other hand, Turing machines are equivalent to machines that have an unlimited amount of storage space for their computations. However, Turing machines are not intended to model computers, but rather they are intended to model computation itself. Historically, computers, which compute only on their fixed internal storage, were developed only later. There are a number of ways to explain why Turing machines are useful models of real computers: Anything a real computer can compute, a Turing machine can also compute. Thus, a statement about the limitations of Turing machines will also apply to real computers. The difference lies only with the ability of a Turing machine to manipulate an unbounded amount of data. However, given a finite amount of time, a Turing machine like a real machine can only manipulate a finite amount of data. Like a Turing machine, a real machine can have its storage space enlarged as needed, by acquiring more disks or other storage media. Descriptions of real machine programs using simpler abstract models are often much more complex than descriptions using Turing machines. For example, a Turing machine describing an algorithm may have a few hundred states, while the equivalent deterministic finite automaton DFA on a given real machine has quadrillions. This makes the DFA representation infeasible to analyze. Turing machines describe algorithms independent of how much memory they use. There is a limit to the memory possessed by any current machine, but this limit can rise arbitrarily in time. Turing machines allow us to make statements about algorithms which will theoretically hold forever, regardless of advances in conventional computing machine architecture. Turing machines simplify the statement of algorithms. Algorithms running on Turing-equivalent abstract machines are usually more general than their counterparts running on real machines, because they have arbitrary-precision data types available and never have to deal with unexpected conditions including, but not limited to, running out of memory. An experimental prototype of a Turing machine Limitations of Turing machines[edit] Computational complexity theory[edit] Further information: Computational complexity theory A limitation of Turing machines is that they do not model the strengths of a particular arrangement well. For instance, modern stored-program computers are actually instances of a more specific form of abstract machine known as the random-access stored-program machine or RASP machine model. Unlike the universal Turing machine, the RASP has an infinite number of distinguishable, numbered but unbounded "registers"â€”memory "cells" that can contain any integer cf. Elgot and Robinson , Hartmanis , and in particular Cook-Rechow ; references at random access machine. An example of this is binary search , an algorithm that can be shown to perform more quickly when using the RASP model of computation rather than the Turing machine model. This section does not cite any sources. Please help improve this section by adding citations to reliable sources. Unsourced material may be challenged and removed. April Learn how and when to remove this template message Another limitation of Turing machines is that they do not model concurrency well. For example, there is a bound on the size of integer that can be computed by an always-halting nondeterministic Turing machine starting on a blank tape. See article on unbounded nondeterminism. By contrast, there are always-halting concurrent systems with no inputs that can compute an integer of unbounded size. A process can be created with local storage that is initialized with a count of 0 that concurrently sends itself both a stop and a go message. When it receives a go message, it increments its count by 1 and sends itself a go message. When it receives a stop message, it stops with an unbounded number in its local storage. Interaction[edit] In the early days of computing, computer use was typically limited to batch processing , i. Computability theory, which studies computability of functions from inputs to outputs, and for which Turing machines were invented, reflects this practice. Since the s, interactive use of computers became much more common. That the whole of development and operations of analysis are now capable of being executed by machinery. Any sequence of operations is an operation. Iteration of an operation repeating n times an operation P. Conditional iteration repeating n times an operation P conditional on the "success" of test T. Gandy states that "the functions which can be calculated by 1 , 2 , and 4 are precisely those which are Turing computable. The fundamental importance of conditional iteration and conditional transfer for a general theory of calculating machines is not recognizedâ€¦ â€" Gandy p. Determination of the solvability of a Diophantine equation. Given a Diophantine equation with any number of unknown quantities and with rational integral coefficients: To devise a process according to which it can be determined in a finite number of operations whether the equation is solvable in rational integers. The Entscheidungsproblem [decision problem for first-order logic] is solved when we know a procedure that allows for any given logical expression to decide by finitely many operations its validity or satisfiability The Entscheidungsproblem must be considered the main problem of mathematical logic. A quite definite generally applicable prescription is required which will allow one to decide in a finite number of steps the truth or falsity of a given purely logical assertion If one were able to solve the Entscheidungsproblem then one would have a "procedure for solving many or even all mathematical problems". First, was mathematics complete Second, was mathematics consistent And thirdly, was mathematics decidable? The problem was that an answer first required a precise definition of "definite general applicable prescription", which Princeton professor Alonzo Church would come to call " effective calculability ", and in no such definition existed. But over the next 6â€"7 years Emil Post developed his definition of a worker moving from room to room writing and erasing marks per a list of instructions Post , as did Church and his two students Stephen Kleene and J. In the meantime, Emil Post submitted a brief paper in the fall of , so Turing at least had priority over Post.

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4: Jay Ponder's Home Page

The corrugation amplitude of the tunneling current, i.e., the maximal lateral variation of the perpendicular tip excursion for constant tunnel current, is directly measured in STM experiments and can serve as a test for the theoretical approaches to scanning tunneling microscopy.

Indeed, he developed what amounts to the first comprehensive cognitive theory, a theory that has been enormously influential over the subsequent ages, and continues mostly indirectly to shape much scientific and philosophical thought about the mind even today. He was clearly aware of, and very possibly influenced by, the mnemonic imagery techniques in use in Greece see supplement , to which he alludes in at least four passages in his extant writings Topica b28, De Anima b18, De Memoria a12â€"16, De Insomniis b20â€" Some modern scholars, it should be noted, have questioned the translation of "phantasma" as "image," in part because Aristotle does not always seem to think of phantasmata as inner pictures, and also because he seems to think of them as playing a role in perception itself Nussbaum, ; Schofield, ; Birondo, As Hume distinguished impressions from ideas, contemporary colloquial English distinguishes between percepts and the mental images that we experience when we fantasize, daydream, or recall some experience from memory. It has thus been suggested that "phantasma" would be better translated as "appearance" Lycos, or "presentation" Beare, rather than as "image". However, contemporary scientific theories of imagery see sections 4. In any case, it is abundantly clear that, in many even if not all cases, Aristotle uses "phantasma" to refer to what we now call a mental image. Phantasmata have several functions paralleling those ascribed to imagery by modern folk psychology and some scientific psychology. Not only does remembering essentially involve the recall of imagery of past experiences, but, he tells us, "It is impossible to think without an image [phantasma]," De Memoria a 1; cf. Phantasmata also play a key role in his account of desire and motivation e. De Anima a â€" see Nussbaum, When some desirable object is not actually present to our senses, exerting its pull on us directly, our motivation to strive to obtain it is driven by our awareness of its memory or fantasy image. This idea is still found in modern, scientific theories of desire McMahon ; Kavanagh et al. Aristotle also apparently held that linguistic meaning derives from imagery, spoken words being but the symbols of the inner images De Interpretatione 16a 5â€"9; De Anima b 29â€"32; see Modrak, Today, few theorists of language take this notion seriously but see Paivio, , ; Prinz, , but it was almost universally accepted until relatively recent times Wollock, ; and see section 3. Aristotle has been accredited with the very invention of the concept of imagination Schofield, , and certainly it seems fair to say that the roots of most subsequent discussions of the concept can be traced back to his work even though, for him, it did not have the strong association with creativity and aesthetic insight that it has since acquired, mostly through the influence of the Romantic movement Watson, ; White, ; Thomas, a. Ideas were mental representations, and very frequently, though not necessarily always, they were explicitly or implicitly conceived of as mental images. Even if some authors did not themselves take ideas to be images, it is likely that many of their readers would have taken them to be doing so. Thus, claims about the nature of ideas, and the cognitive and epistemological roles they could or could not play, were often conditioned by whether or not a philosopher did conceive of ideas as images, and by what imagery was taken to be. We are told that we can attain clear and distinct ideas of such things as God and the human mind Meditation 4, Neither of these are things of which we have perceptual, let alone quasi-perceptual, experience. But Descartes insists that even our ideas of perceptible things are, inasmuch as they are clear and distinct, not perceptual or imaginative. His perceptual and imaginative grasp of the nature of a piece of wax, he tells us, can never match the clarity and distinctness of the idea of the wax that can potentially be attained by purely mental scrutiny Meditation 2, These ideas may not be capable of providing the sure epistemological foundation that Descartes thinks the clear and distinct ideas of the intellect can give us, but they are real nonetheless, and probably play a larger role in ordinary, non-philosophic thinking. Although they are alluded to in many of Descartes works, these imagistic ideas are explained most fully in the

Treatise of Man, where he propounds his speculative physiological theory of visual perception in some detail. As a result of the formation of optical images on the retinae of the eyes, the nerves produce another image, isomorphic to the retinal image[7] but re-inverted, so as to be upright , that is picked out on the surface of the gland by the flow of animal spirits through its pores. The tracing of the image on its surface causes the gland to move in a subtle and complex fashion that in some unexplained way causes a conscious visual experience of the arrow in the soul Descartes â€" see particularly pp. At the same time that the flow of animal spirits is causing visual experiences by moving the pineal, elsewhere in the brain it is causing visual memories to be laid down by its action upon the nerve fibres themselves. These changes to hydraulic structure of the brain allow for mental images of memory and imagination to arise by the recreation of formerly experienced flow patterns of spirits at the pineal surface. On the other hand, in his letter to Mersenne of July he seems to say just the opposite: The thought here seems to be that all ideas as such are in our minds, although some of them are caused or occasioned by the presence of an image on the pineal surface. It is notable, however, that this comparison is made in the course of an argument to the effect that the representations in the brain that cause our perceptual and imaginative experiences need not actually resemble their objects: What matters, for Descartes, is that the conscious soul is appropriately affected by the movements that the process of image formation causes in the pineal gland. Thus it is the functional role of the image, not its actual physical nature, that is important. Rather, it is that of a movement gradually running out of impetus, a pendulum swing gradually decreasing in amplitude, or a gas under pressure gradually leaking away. Furthermore, Hobbes, unlike Descartes, did not think of memory as being the result of structural changes in the brain, but rather as arising from the persistence, the very slow dying away, of the internal motions that were originally set going by sense experience Leviathan I. Although they are undoubtedly quasi-perceptual experiences presumably, in the absence of an immaterial soul, we are to suppose that they are experienced merely in virtue of their occurring within the brain they may not be mental pictures in any very robust sense. Henceforth, at least until the rise of cognitive science in the late 20th century, that would be seen as the concern of scientists rather than philosophers[13] and as it turned out, the scientists did not have much to say about the matter either, until, once again, the era of cognitive science. It is thus hardly surprising that, according to Lowe p. This orthodoxy is defended by Ayers , and White amongst others, but other recent Locke scholars, notably Yolton , , , , , Chappell , and, more tentatively, Lowe , challenge it, arguing that the explicit comparisons of ideas with pictures are all limited merely to bringing out some or other specific aspect of the nature of ideas, and should not be read as identifying them with pictures. According to Yolton, there is no evidence that Locke thought of ideas as entities of any sort Yolton p. Enactive theories of imagery see section 4. He certainly held that they arise from perception,[15] and that we are conscious of them when we employ them in our thinking Essay II. Few seem to doubt that Berkeley thought of ideas as being images but see Pitcher, ; Kasem, Indeed, his famous and influential attack in The Principles of Human Knowledge on the possibility of abstract or general ideas clearly derives most of its persuasiveness from the assumption that ideas are like pictures: For my self I find indeed I have a Faculty of imagining, or representing to myself the Ideas of those particular things I have perceived and of variously compounding and dividing them. I can consider the Hand, the Eye, the Nose, each by itself abstracted or separated from the rest of the Body. I cannot by any effort of Thought conceive the abstract Idea above described. And it is equally impossible for me to form the abstract Idea of Motion distinct from the Body moving, and which is neither Swift nor Slow, Curvilinear nor Rectilinear; and the like may be said of all other abstract general Ideas whatsoever. Or again, a general idea of a triangle must be neither Oblique nor Rectangle, neither Equilateral, Equicrural, nor Scalenon, but all and none of these at once? If they are not images at all, it makes little sense and if mental images are not much like pictures, it is probably invalid. As with Locke, Yolton argues that Hume did not understand the ideas of his cognitive theory to be mental images. Clearly the word alludes to the wax impression model of perception and memory that we find in Plato and Aristotle, and although Hume, no doubt, does not intend it to be understood too literally, the fact that he thinks it an appropriate and innocuous metaphor remains telling. Reid is not saying that we do not have quasi-perceptual experiences, but he wants to deny that these are caused by representational mental entities that we experience in lieu of some actually present physical object or scene. However, images still have a significant role to play in his account of how our concepts connect to empirical reality. The imagination einbildungskraft must synthesize the inchoate deliverances of the senses, the sensory manifold, into a coherent, meaningful image, a true representation that the understanding can grasp and bring under some concept. Unfortunately, Kant was unable to give a satisfactory account of how the imagination, even in concert with the understanding, can achieve this. Unfortunately, however, This schematism of our understanding, in its application to appearances and their mere form, is an art concealed in the depths of the human soul, whose real modes of activity nature is hardly likely ever to allow us to discover, and to have open to our gaze. Thus Kant, in attempting to grapple with problems about the nature of mental representation that the Empiricists had failed to solve, left the process of image formation, and the nature of the image itself, deeply mysterious. Imagery in the Age of Scientific Psychology When psychology first began to emerge as an experimental science, in the philosophy departments of the German universities in the late 19th century, and soon after in the United States, the central role of imagery in mental life was not in question. For these pioneering experimentalists, such as Wilhelm Wundt in Germany and William James in America, mental images often, following the established usage of the Empiricist philosophical tradition, referred to as ideas held just the same central place in the explanation of cognition that they had held for philosophical psychologists of earlier times. Titchener, a student of Wundt who established himself as a leading figure in American psychology, was particularly interested in imagery, and an experiment performed by one of his students, C. Perky, has become particularly well known. It is often assumed that it shows that there is no qualitative experiential difference between mental images and percepts, but further experimental investigations have raised some doubts about this conclusion see Supplement: However, developments within psychology at the beginning of the 20th century began to cast doubt on this long established consensus. Their results were challenged on several grounds by Wundt, Titchener and others, and were certainly never definitively established. Nevertheless, the bitter dispute that ensued, the so called imageless thought controversy, had a profound effect on the development of scientific psychology and, very arguably, philosophy too. Most psychologists became, in effect, profoundly disillusioned with the whole notion of mental imagery, and either avoided seriously considering the topic, treated it dismissively, or, in some extreme cases, denied the existence of the phenomenon outright. These attitudes noticeably influenced other disciplines, including philosophy. Although the psychological study of imagery revived with the rise of cognitivism in the s and 70s, when new experimental techniques were developed that enabled a truly experimental study of the phenomenon, current views about, and attitudes towards, mental imagery cannot be properly understood without an awareness of this history, versions of which, of varying degrees of accuracy, have passed into the folklore of psychology.

TURN SCANNING: EXPERIMENTAL AND THEORETICAL APPROACHES TO THE ROLE OF TURNS pdf

5: Home | Turnitin

In recent years, tremendous progress has been made in understanding the main principles behind such "active dynamical processes" due to the development of fundamentally new theoretical ideas, novel experimental techniques to perform high precision mechanical measurements on live cells, and the development of simplified in-vitro systems.

The first transformation was accomplished by ignoring the implications of a long standing distinction between observing and experimenting. To experiment is to isolate, prepare, and manipulate things in hopes of producing epistemically useful evidence. It had been customary to think of observing as noticing and attending to interesting details of things perceived under more or less natural conditions, or by extension, things perceived during the course of an experiment. To look at a berry on a vine and attend to its color and shape would be to observe it. To extract its juice and apply reagents to test for the presence of copper compounds would be to perform an experiment. Contrivance and manipulation influence epistemically significant features of observable experimental results to such an extent that epistemologists ignore them at their peril. The logical empiricists tended to ignore it. A second transformation, characteristic of the linguistic turn in philosophy, was to shift attention away from things observed in natural or experimental settings and concentrate instead on the logic of observation reports. The shift developed from the assumption that a scientific theory is a system of sentences or sentence like structures propositions, statements, claims, and so on to be tested by comparison to observational evidence. Secondly it was assumed that the comparisons must be understood in terms of inferential relations. If inferential relations hold only between sentence like structures, it follows that theories must be tested, not against observations or things observed, but against sentences, propositions, etc. Schlick Friends of this line of thought theorized about the syntax, semantics, and pragmatics of observation sentences, and inferential connections between observation and theoretical sentences. In doing so they hoped to articulate and explain the authoritativeness widely conceded to the best natural, social and behavioral scientific theories. Some pronouncements from astrologers, medical quacks, and other pseudo scientists gain wide acceptance, as do those of religious leaders who rest their cases on faith or personal revelation, and rulers and governmental officials who use their political power to secure assent. But such claims do not enjoy the kind of credibility that scientific theories can attain. The logical empiricists tried to account for this by appeal to the objectivity and accessibility of observation reports, and the logic of theory testing. Part of what they meant by calling observational evidence objective was that cultural and ethnic factors have no bearing on what can validly be inferred about the merits of a theory from observation reports. In response to this rationale for ethnic and cultural purging of the German educational system the logical empiricists argued that because of its objectivity, observational evidence, rather than ethnic and cultual factors should be used to evaluate scientific theories. Less dramatically, the efforts working scientists put into producing objective evidence attest to the importance they attach to objectivity. Furthermore it is possible, in principle at least, to make observation reports and the reasoning used to draw conclusions from them available for public scrutiny. If observational evidence is objective in this sense , it can provide people with what they need to decide for themselves which theories to accept without having to rely unquestioningly on authorities. Francis Bacon argued long ago that the best way to discover things about nature is to use experiences his term for observations as well as experimental results to develop and improve scientific theories Bacon 49ff. The role of observational evidence in scientific discovery was an important topic for Whewell and Mill among others in the 19th century. Recently, Judaea Pearl, Clark Glymour, and their students and associates addressed it rigorously in the course of developing techniques for inferring claims about causal structures from statistical features of the data they give rise to Pearl, ; Spirtes, Glymour, and Scheines But such work is exceptional. Popper , 31 Drawing a sharp distinction between discovery and justification, the standard philosophical literature devotes most of its attention to the latter. Although theory testing dominates much of the standard philosophical literature on observation, much of what this entry says about the role of observation in theory testing applies also to its role in inventing, and modifying theories, and applying them to tasks in engineering, medicine, and other practical enterprises. Theories are customarily represented as collections of sentences, propositions, statements or beliefs, etc. Observations are used in testing generalizations of both kinds. Suppe , So conceived, a theory can be adequately represented by more than one linguistic formulation because it is not a system of sentences or propositions. Instead, it is a non-linguistic structure which can function as a semantic model of its sentential or propositional representations. Suppe , â€” This entry treats theories as collections of sentences or sentential structures with or without deductive closure. But the questions it takes up arise in pretty much the same way when theories are represented in accordance with this semantic account. What do observation reports describe? One answer to this question assumes that observation is a perceptual process so that to observe is to look at, listen to, touch, taste, or smell something, attending to details of the resulting perceptual experience. In either case, observation sentences describe perceptions or things perceived. Observers use magnifying glasses, microscopes, or telescopes to see things that are too small or far away to be seen, or seen clearly enough, without them. Similarly, amplification devices are used to hear faint sounds. But if to observe something is to perceive it, not every use of instruments to augment the senses qualifies as observational. Philosophers agree that you can observe the moons of Jupiter with a telescope, or a heart beat with a stethoscope. But minimalist empiricists like Bas Van Fraassen , 16â€”17 deny that one can observe things that can be visualized only by using electron and perhaps even light microscopes. Their intuitions come from the plausible assumption that one can observe only what one can see by looking, hear by listening, feel by touching, and so on. Investigators can neither look at direct their gazes toward and attend to nor visually experience charged particles moving through a bubble chamber. Instead they can look at and see tracks in the chamber, or in bubble chamber photographs. The identification of observation and perceptual experience persisted well into the 20th centuryâ€”so much so that Carl Hempel could characterize the scientific enterprise as an attempt to predict and explain the deliverances of the senses Hempel , This was to be accomplished by using laws or lawlike generalizations along with descriptions of initial conditions, correspondence rules, and auxiliary hypotheses to derive observation sentences describing the sensory deliverances of interest. Theory testing was treated as a matter of comparing observation sentences describing observations made in natural or laboratory settings to observation sentences that should be true according to the theory to be tested. This makes it imperative to ask what observation sentences report. Even though scientists often record their evidence non-sententially, e. Hempel , This view is motivated by the assumption that the epistemic value of an observation report depends upon its truth or accuracy, and that with regard to perception, the only thing observers can know with certainty to be true or accurate is how things appear to them. For the phenomenalist it follows that reports of subjective experience can provide better reasons to believe claims they support than reports of other kinds of evidence. Worse yet, if experiences are directly available only to those who have them, there is room to doubt whether different people can understand the same observation sentence in the same way. How could you decide whether her visual experience was the same as the one you would use her words to report? Observers do sometmes have trouble making fine pointer position and color discriminations but such things are more susceptible to precise, intersubjectively understandable descriptions than subjective experiences. How much precision and what degree of intersubjective agreement are required in any given case depends on what is being tested and how the observation sentence is used to evaluate it. And similarly for non-sentential records; a drawing of what the observer takes to be the position of a pointer can be more reliable and easier to assess than a drawing that purports to capture her subjective visual experience of the pointer. The fact that science is seldom a solitary pursuit suggests that one might be able to use pragmatic considerations to finesse questions about what observation reports express. Scientific claimsâ€”especially those with practical and policy applicationsâ€”are typically used for purposes that are best served by public evaluation. Furthermore the development and application of a scientific theory typically requires collaboration and in many cases is promoted by competition. This, together with the fact that investigators must agree to accept putative evidence before they use it to test a theoretical claim, imposes a pragmatic condition on observation reports: Feyerabend took this requirement seriously enough to characterize observation sentences pragmatically in terms of widespread decidability. In order to be an observation sentence, he said, a sentence must be contingently true or false, and such that competent speakers of the relevant language can quickly and unanimously decide whether to accept or reject it on the basis what happens when they look, listen, etc. If epistemic trustworthiness requires certainty, this requirement favors the phenomenalists. Philosophers need to address the question of how these two requirements can be mutually satisfied. Is observation an exclusively perceptual process? Many of the things scientists investigate do not interact with human perceptual systems as required to produce perceptual experiences of them. The methods investigators use to study such things argue against the ideaâ€"however plausible it may once have seemedâ€"that scientists do or should rely exclusively on their perceptual systems to obtain the evidence they need. Thus Feyerabend proposed as a thought experiment that if measuring equipment was rigged up to register the magnitude of a quantity of interest, a theory could be tested just as well against its outputs as against records of human perceptions Feyerabend , â€" Feyerabend could have made his point with historical examples instead of thought experiments. A century earlier Helmholtz estimated the speed of excitatory impulses traveling through a motor nerve. To initiate impulses whose speed could be estimated, he implanted an electrode into one end of a nerve fiber and ran a current into it from a coil. The other end was attached to a bit of muscle whose contraction signaled the arrival of the impulse. To find out how long it took the impulse to reach the muscle he had to know when the stimulating current reached the nerve. This meant arranging things so that current from the coil could deflect a galvanometer needle. Assuming that the magnitude of the deflection is proportional to the duration of current passing from the coil, Helmholtz could use the deflection to estimate the duration he could not see ibid. Such devices enable the observer to scrutinize visible objects. The miniscule duration of the current flow is not a visible object. Helmholtz studied it by looking at and seeing something else. Hooke , 16â€"17 argued for and designed instruments to execute the same kind of strategy in the 17th century. Consider functional magnetic resonance images fMRI of the brain decorated with colors to indicate magnitudes of electrical activity in different regions during the performance of a cognitive task. The magnetic force coordinates the precessions of protons in hemoglobin and other bodily stuffs to make them emit radio signals strong enough for the equipment to respond to. When the magnetic force is relaxed, the signals from protons in highly oxygenated hemoglobin deteriorate at a detectably different rate than signals from blood that carries less oxygen. Elaborate algorithms are applied to radio signal records to estimate blood oxygen levels at the places from which the signals are calculated to have originated. There is good reason to believe that blood flowing just downstream from spiking neurons carries appreciably more oxygen than blood in the vicinity of resting neurons. Assumptions about the relevant spatial and temporal relations are used to estimate levels of electrical activity in small regions of the brain corresponding to pixels in the finished image. The results of all of these computations are used to assign the appropriate colors to pixels in a computer generated image of the brain. The role of the senses in fMRI data production is limited to such things as monitoring the equipment and keeping an eye on the subject. Their epistemic role is limited to discriminating the colors in the finished image, reading tables of numbers the computer used to assign them, and so on. If anything is observed, the radio signals that interact directly with the equipment would seem to be better candidates than blood oxygen levels or neuronal activity. The production of fMRI images requires extensive statistical manipulation based on theories about the radio signals, and a variety of factors having to do with their detection along with beliefs about relations between blood oxygen levels and neuronal activity, sources of systematic error, and so on. In view of all of this, functional brain imaging differs, e. And similarly for many other methods scientists use to produce non-perceptual evidence. In their place, working scientists tend to talk about data. Philosophers who adopt this usage are free to think about standard examples of observation as members of a large, diverse, and growing family of data production methods. Instead of trying to decide which methods to classify as observational and which things qualify as observables, philosophers can then concentrate on the epistemic influence of the factors that differentiate members of the family. In particular, they can focus their attention on what questions data produced by a given method can be used to answer, what must be done to use that data fruitfully, and the credibility of the answers they afford. Bogen It is of interest that records of perceptual observation are not always epistemically superior to data from experimental equipment. Indeed it is not unusual for investigators to use non-perceptual evidence to evaluate perceptual data and correct for its errors. For example, Rutherford and Pettersson conducted similar experiments to find out if certain elements disintegrated to emit charged particles under radioactive bombardment.

6: Growing (Up) from the Nanoscale to the Mesoscale - Mesoscale Chemistry - NCBI Bookshelf

Research in my group focuses on computational chemistry. In particular, we are involved in the development and application of computational tools addressing current problems in structural biology, protein engineering, organic chemistry and materials science.

These studies also benefit from the expertise and knowledge base acquired over decades of semiconductor manufacturing, from a century or more of advances in synthetic chemistry, and from the biotechnology and molecular biology revolution. Following the dynamics of these systems and understanding how they evolve at the mesoscale is important, not at the level of each and every atom or molecule, but at a level that will provide useful insights. It is also importantâ€"and challengingâ€"to understand the role of heterogeneity at the mesoscale. The ability to control chemical functionality is a key to mesoscale studies because that will in turn control and tune the interactions and interfaces at the mesoscale in ways that can be used to couple materials together to develop new capabilities. Chemists have used their tools to design building blocks that can be put together to create larger structures in ways that provide specific control over molecular interactions and interfaces. Thus they can study and investigate these phenomena at the mesoscale and develop a theoretical understanding of how mesoscale properties emerge. In a plenary session to start the workshop, Paul Weiss, Distinguished Professor of Chemistry and Biochemistry and of Materials Science and Engineering, and the Fred Kavli Chair in NanoSystems Sciences at the University of California, Los Angeles, described the defining chemical, physical, optical, mechanical, and electronic properties of surfaces and supramolecular assemblies and discussed the cooperative behavior observed between functional molecules. He explained that there are two ways to approach the mesoscale, just as there is the nanoscaleâ€"from the bottom up or from the top downâ€"though in the mesoscale, the requirements for precision in measurement and synthesis are more relaxed than they are when operating at the nanoscale. For example, when looking at the statistical and ensemble properties at the mesoscale or at cooperative effects across different regions or materials in a mesoscale structure, there are some details that can be ignored or minimized without sacrificing precision in describing the phenomena that are occurring in a given system. The two approaches are complementary, however, and Weiss noted that mesoscale studies are benefiting from the experimental, theoretical, and simulation tools developed to explore nanoscale phenomena and build the field of nanotechnology, as well as from the expertise and knowledge base acquired over decades of semiconductor manufacturing, from a century or more of advances in synthetic chemistry, and from the biotechnology and molecular biology revolution. Weiss explored many key components of mesoscale phenomena: At the mesoscale, these components play important roles in determining the band structure of conductors and semiconductors and are important to understand for creating photonic, plasmonic, spintronic, and metamaterials. Collective effects, such as superconductivity, ferroelectricity, and piezoelectricity, also result from interactions occurring at the mesoscale. One important challenge in studying mesoscale collective effects is accounting for heterogeneity and fluctuations. When working at the nanoscale, said Weiss, it is possible to exercise exquisite control over the position of every atom, but working at the mesoscale requires giving up that kind of control and instead embracing the granularity of structures at this scale. He noted that this is where techniques developed in the s by the semiconductor industry could prove valuable for developing and studying mesoscale structures and that there are many unused semiconductor foundries built to produce earlier-generation computer chips that could be turned to this work. As he put it, nobody will complain about the exact placement of impurities in a semiconductor when working at the mesoscale. Techniques such as soft lithography, microcontact printing Dameron et al. However, they are not applicable for creating the latest semiconductor structures. He stressed that the ability to control chemical functionality is the key to this work because that will in turn control and tune the interactions and interfaces at the mesoscale in ways that can be used to couple materials together to develop new capabilities. Working at the mesoscale and the averaging that comes with that does mean giving up some details. For example, x-ray data from crystals of DNA led to deducing the double-helix structure of DNA, but it would not provide any information on the sequence of bases. One of the surprises from the Human Genome Project, Weiss noted, was that though there are a million different proteins that are present in human beings, there are only about 21, genes to provide that coding. As an aside, he reminded the workshop that the U. Returning to the subject at hand, Weiss also reminded the workshop participants that it is important when making materials at the mesoscale to keep in mind the desired function of those materials and the phenomena that need to be measured. Chemists, meanwhile, have used their tools to design building blocks that can be put together to create larger structures in ways that provide specific control over molecular interactions and interfaces to study and investigate these phenomena. The construction of colloidal fullerene crystals with precise structures Claridge et al. The reason for that predictability, he explained, is that the interactions between the different components in these systems are relatively weak because of the way the linkers hold the different components apart from one another. Using chemistry, it is possible to create additional clusters and materials that can in turn inform the theoretical understanding of how mesoscale properties emerge and to test those theories. Weiss built on this example of the benefit of chemistry as part of an interdisciplinary approach to research at the mesoscale with a few more examples. Turning to the subject of defects, Weiss explained that they can be exploited for patterning but that they can also lead to pattern dissolution. In early studies of mesoscale defects, he and his colleagues showed that mesoscale systems using self-assembled monolayers are never at equilibrium but that the defects can be guided to a specific location and with a specific density and then frozen at the place Weiss The defects that remained were ones that could be used to insert functional components into the material, and these functional components could be observed and measured using either scanning tunneling microscopy or spectroscopic methods Zheng et al. Studies of carboranesâ€”molecules in which the carbon atoms are hexacoordinate rather than tetracoordinate and are therefore electron deficientâ€”demonstrate one aspect of the kind of control that can be achieved over mesoscale structures. Placement of the carbon atoms in these materials determines the direction of the dipole in the carborane molecule. When these cage molecules self-assemble in monolayers, they can have the dipole oriented parallel or perpendicular to the material surface Figure , which creates either polar or nonpolar structures Hohman et al. Figure The alignment of dipoles on the surface of a self-assembled monolayer has an important impact on the chemical properties of the resulting surface. Reprinted with permission from ACS Nano. Weiss noted that it is possible to measure buried dipoles in these systems. In one set of experiments, his group wanted to know if aligned dipoles are responsible for the competitive advantage of the nonpolar surface and, in fact, aligned dipoles do create a defect-tolerant system. Spectroscopic measurements and mathematical analysis showed that the dipole interaction occurs over a long enough range to create a two-dimensional ferroelectric system. Instead, these mesoscale interactions allow the molecules to cross step edges that are a couple of angstroms high and cross domain boundaries that are offset by a couple of angstroms. The result is that these self-assembled monolayers have large regions where the dipoles are aligned even when there are defects that would normally prevent such alignment from occurring. In his final remarks, Weiss drew some lessons from nanotechnology to comment on the type of tools that need to be developed and applied to understand mesoscale phenomena. In nanotechnology, he said, there were structural tools that let researchers observe and control the placement of individual atoms and molecules to develop some predictive rules regarding structure and function at the nanoscale. He also noted that while he did not talk about dynamics, it is going to be important to follow dynamics and understand how these systems evolve at the mesoscale, not at the level of each and every atom or molecule but at a level that will provide useful insights. He predicted that mathematical tools will be useful in this regard. The ability to measure and detect rare events in mesoscale structures will also be important, particularly for developing novel catalysts, where rare structures are often the ones that have the largest catalytic activity. He concluded his talk with the prediction that the tools needed to understand the mesoscale are going to be complicated and it will be necessary to piece together information in a way that does not require knowing the position and function of every atom in these structures. However, he noted that much of the work with organic electronics has been empirical rather than driven by predictions based on well-formulated theory, and this is an area where mesoscale research could produce significant advances in terms of understanding how to intentionally control chemical and polymer properties to produce specific properties. Weiss then addressed the issue of metastability at the mesoscale. He stated that when researchers were first performing chemical conversions on self-assembled monolayers, they would use the most vigorous chemical reactions they could find so that these conversions would go to completion. That, however, turned out to be a bad idea because the monolayers would anneal. What was needed, he explained, was to develop chemistry that preserves metastable structures and yet goes to completion or to develop methods of only carrying out chemistry at defects. These systems, he said, are metastable systems, not equilibrium systems, and it is necessary to preserve that metastability to produce materials with novel and useful properties. Copyright by the National Academy of Sciences.

7: CiteSeerX â€” Turn Scanning: Experimental and Theoretical Approaches to the Role of Turns

Experimental and computational approaches to estimate solubility and permeability in discovery and development settings are described. In the discovery setting `the rule of 5' predicts that poor absorption or permeation is more likely when there are more than 5 H-bond donors, 10 H-bond acceptors, the molecular weight (MWT) is greater than and the calculated Log P (CLogP) is greater than 5.

8: Turing machine - Wikipedia

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9: Cultural turn - Wikipedia

Experimental Approaches in Theoretical Phonology experiments at least show that we need to be careful when talking about the categoricality of phonological changes.

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