心理與神經資訊學
(Psychoinformatics & Neuroinformatics)

課號: Psy5261
識別碼: 227U9340

教室:綜合302
時間: 五234

黃從仁

課程資訊 & 聯絡方式

~~**課程網站**: http://ceiba.ntu.edu.tw/1082best~~
~~(課程投影片、公佈成績)~~

非同步資源: http://cool.ntu.edu.tw
(除了作業外的所有資源)

作業網站: http://hpc.psy.ntu.edu.tw/info
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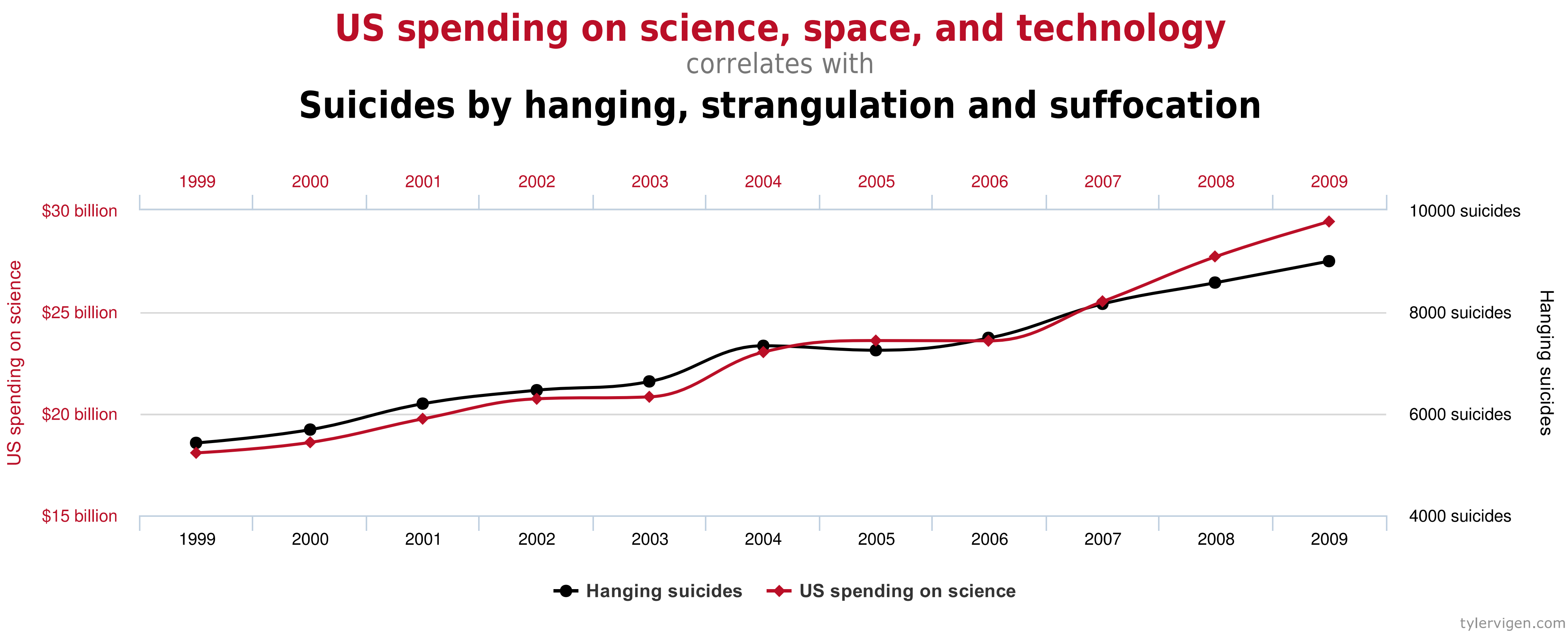
課程助教: ntu_info@googlegroups.com
(程式問題、分數問題)


書局電腦書都可以參考喔！

單機實驗程式
(PsychoPy)

上吊自殺 vs. 科研經費



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認真研究超英趕美

相關不能推論因果

實驗找出行為開關

心理學案例研究(1/5)

在MIT的Mary C. Potter奶奶發明了
Rapid Serial Visual Presentation (RSVP)

心理學案例研究(2/5)

1964年發表在Science的心理學文章長這樣:

Interference in Visual Recognition

Abstract. *Pictures of common objects, coming slowly into focus, were viewed by adult observers. Recognition was delayed when subjects first viewed the pictures out of focus. The greater or more prolonged the initial blur, the slower the eventual recognition. Interference may be accounted for partly by the difficulty of rejecting incorrect hypotheses based on substandard cues.*

Under ordinary conditions, visual recognition operates effortlessly and with no discernible interference. If the clarity of the display is diminished in some manner, however, recognition understandably takes longer. Moreover, studies indicate that if a subject is *initially* exposed to a blurred image that he cannot recognize, subsequent recognition of the image in clearer form is substantially delayed (*1*). The present report is concerned with the further investigation of this interference phenomenon.

We varied both the range of blur to which subjects were exposed and the length of time of the exposure. Undergraduate subjects were shown eight ordinary color photographs, projected one at a time. The pictures were initially exposed in a state of blur and brought continuously into better focus. The initial point of focus was varied, as was the amount of time the changing picture was in view. Under all conditions, the picture being exposed was stopped at the same point of focus, regardless of its starting point and its rate of change of focus. At this common terminal point, the projected picture was turned off and the subject was asked to report what it was.

Three starting points of focus and the common stopping point were determined as follows. Thirteen subjects were run individually as a standardizing group and were presented the pictures in gradually increasing focus, starting from almost complete blur (very blurred, or VB). The point at which they reported correctly the identity of the picture was recorded. For each picture, the point at which it was first recognized by any subject was obtained (light blur, or LB), and likewise the point at which a quarter of the subjects recognized the objects (first quartile, or FQ) (*2*); this latter was the stopping point used with all later groups. A fourth point was computed for each picture that was about four-fifths of the way from the out-of-focus point (VB) to the point of first recognition (LB). This point we refer to as medium blur (MB). Each of these points varied, of course, from picture to picture, since some pictures in fact required more clarity for recognition than did others. Each picture, changing toward clearer focus, was exposed for one of three lengths of time, the exposure intervals being chosen in the following manner. A slow but constant rate of change was first selected such that the time between VB and FQ (the stopping point) averaged 122 seconds per picture (range from 92 to 145 seconds). At this same rate of change, the average time from MB to FQ was 35 seconds (range from 26 to 49 seconds), and the time from LB to FQ was 13 seconds (range from 4 to 25 seconds).

Eighty-nine new subjects were now divided into nine groups of approximately equal size. Three of these groups began their viewing of each picture at VB; of these three, one group covered the course from VB to FQ in the long exposure averaging 122 seconds, one covered the same course of focus in the medium exposure of 35 seconds, and one in the short exposure of 13 seconds. Likewise, three other groups viewed the pictures moving from MB to FQ with the same three exposure times. And a final three groups started at LB and were given the same three times of viewing, thus completing a 3 × 3 design.

The pictures, 35-mm Kodachrome slides, were of a dog standing on grass, a bird in the sky, an aerial view of a cloverleaf intersection, a pile of bricks, a fire hydrant, silverware on a rug, glass ashtrays piled on a desk, and a set of brass fire irons. A Sawyer projector, model 500 EE, was used in a dimly lit room to project the pictures onto a non-glare screen 4.5 m away. A variable-speed motor controlled the excursion of the lens barrel, allowing focus to be changed at a wide range of rates. Subjects were run in groups up to 12, seated in two semicircular rows averaging 3.5 m from the screen. All subjects had normal vision or corrected normal vision as tested by a Snellen chart. They wrote their responses to the pictures on prepared sheets.

The results are shown in Table 1, and an analysis of variance is given in Table 2, based on the number of pictures (out of eight) recognized by each subject (*3*). Viewing time has a systematic effect: on the average, the longer the viewing time permitted, the more frequently a picture is recognized. Although the interaction between time and focus is not significant, there is a suggestion in Table 1 that viewing time has a greater effect on recognition in the range LB to FQ than in the other focal ranges. Consider next the recognition scores of the groups that began viewing at different starting levels of focus. Here the interfering effect of viewing on subsequent recognition is striking, ranging from slightly less than a quarter of the subjects recognizing pictures when they began their viewing with a very blurred image, to well over half achieving recognition when viewing began with light blur.

Table 1. Percentage of pictures recognized under various conditions of time and focal range. Each subject had eight pictures.

Average viewing time per picture (sec)	Focal range			
	VB–FQ	MB–FQ	LB–FQ	Mean
122	25.0 ($N=8$)	50.7 ($N=9$)	72.9 ($N=9$)	49.5
35	25.4 ($N=14$)	44.4 ($N=9$)	63.8 ($N=10$)	44.5
13	19.4 ($N=10$)	39.1 ($N=8$)	42.7 ($N=12$)	33.7
Mean	23.3	44.7	59.8	

One way of dramatizing the striking interference effect that comes from early exposure to the blurred version of visual displays is to compare two groups of subjects who were exposed to the same focal range, one group shifting from medium blur (MB) to the terminal point (FQ), and the other group shifting at the same rate but in the opposite direction, from FQ to MB. There were nine and ten subjects respectively in the two groups. The group that viewed the pictures coming *into* focus recognized them in 44 percent of the cases for the eight pictures. The group that viewed the pictures going *out* of focus over the same range succeeded in 76 percent of the cases—a highly reliable difference.

Table 2. Analysis of variance of number of pictures recognized by each subject with different viewing times and focal ranges.

Source	*df*	Mean square	*F*	*p*
Time	2	1.252	5.70	.01
Focal range	2	6.463	29.43	.001
Interaction	4	.283	1.29	n.s.*
Error	80	.2196		

* Not significant

Do individual subjects differ in their ability to recognize pictures? Kendall's measure of concordance, W, was used to test the consistency of recognition scores of the 13 standardizing subjects. The result was not significant ($W = .116$, $p > .50$), suggesting that there is no general recognition ability under these experimental conditions.

In summary, exposure to a substandard visual display has the effect of interfering with its subsequent recognition. The longer the exposure and the worse the display, the greater the effect. Examination of the responses of the standardizing subjects, who reported aloud from the start of each picture, provides a clue as to the nature of the interference effect. Hypotheses about the identity of the picture are made despite the blur. The ambiguity of the stimulus is such that no obvious contradiction appears for a time, and the initial interpretation is maintained, even when the subject is doubtful of its correctness.

An incorrect interpretation of the picture may occur either in the primary figural organization of the picture (for example, an inhomogeneity is seen as concave, whereas it is convex in the full picture when correctly identified), or in the assignment of identity to a visual organization (the convexity is recognized, but is seen as a pile of earth rather than correctly, say, as a dish of chocolate ice cream). The amount of exposure necessary to invalidate an incorrect interpretation seems to exceed that required to set up a first interpretation, so that at any particular clarity of the display, those who see it for the first time are more likely to recognize the objects than those who started viewing at a less clear stage.

When one views a picture going *out* of focus, both initial clarity and resistance to change of interpretation are pitted in favor of correct recognition, which accounts for the great superiority of this condition. Indeed, it is striking how long one can "hang on" to the identity of a picture which is going out of focus, considering the difficulty of recognizing the same picture when it is seen for the first time coming into focus.

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References and Notes

1. D. Galloway, unpublished thesis, University of California, Berkeley (1946); D. Wyatt and D. Campbell, *J. Abnormal Soc. Psychol.* **46**, 496 (1951); P. Gump, unpublished thesis, University of Colorado (1955); A. Crowell, unpublished thesis, McGill University (1961).
2. Since 13 subjects were used in the standardizing group, the point at which the fourth subject recognized the object was taken as the "first quartile."
3. Since there were unequal numbers of subjects in the various conditions, a method of approximation described by Walker and Lev (*4*) was used.
4. H. Walker and J. Lev, *Statistical Inference* (Holt, New York, 1953), pp. 381–382.

6 March 1964

Myocardial Infarction: A Response to Social Interaction among Chickens

Abstract. *A study of male and female chickens caged alone, in male-female pairs, in groups of four males and in heterosexual groups of 6, 12, and 24, with a proportion of two males to one female, suggests that coronary arterial disease with myocardial infarction may be a response to social interaction, especially interaction that relates to sexual behavior. Myocardial infarcts were limited to males of heterosexual pairs and groups and to females of groups that contained 24 chickens. The lesion was found in males that died at 16 to 44 weeks of age, and in females at 32 to 43 weeks.*

Coronary arterial disease with myocardial infarction was found in about 15 percent of mammals and 10 percent of birds that died in the Philadelphia Zoological Garden from 1 January 1954 to 31 December 1963. These values represent an increased frequency of about tenfold for mammals and fivefold for birds over corresponding records of 1944–1953. Earlier encounters with this disease complex were extremely rare.

This animal collection has been fed the same high-quality diets since 1935, about 20 years before the incidence of myocardial infarction began to increase. However, a life-span of 20 years has more often been a maximum than a mean for many types of animals. Thus, while improved nutrition has increased longevity, neither age nor diet may be related to the increased frequency of myocardial infarction (*1*).

Instead, increased frequency of this disease complex has followed an attempt to establish and maintain breeding pairs and breeding groups of many species of mammals and birds. This departure from earlier practices has also set in motion complex behavioral responses (social interactions) inherent to maturation and reproduction, especially of captive wild animals. Apparently, then, frequency of myocardial infarction in this animal collection reflects intensity of social interactions (*1*).

Tests of this assumption with chickens demonstrated that intensity of social interactions, measured directly by frequency of conflict and indirectly by weights of adrenals and gonads, is a function of group size (groups of 6 as opposed to groups of 12). Further, these chickens developed advanced grades of coronary arterial disease within 35 weeks (*1, 2*). Hence, in our experiment heterosexual groups of 6, 12, and 24 (with a proportion of 2 males to 1 female) were compared with groups of 4 males each, with male-female pairs, and with males and females caged alone. This is a report of the mortality pattern and the occurrence of myocardial infarction that resulted under these conditions.

Birds from a closed, pullorum-free flock of single-comb Hy-line White Leghorns were hatched in one lot, brooded as one flock until they were 7 weeks of age, and then assigned randomly to cages in one large room with 15 hours of light per day. The birds were vaccinated and the sharp edges removed from their beaks at appropriate intervals. Cage assignments and number in each were as follows: 32 males caged alone; 32 females caged alone; 32 male-female pairs; 32 males, 4 to a cage; and heterosexual groups (2 males to 1 female), 12 groups of 6, 10 of 12, and 8 of 24 (total, 544 birds).

Two-tiered commercial battery cages were divided by wooden partitions to allow 2 ft^2 (0.186 m^2) per bird. Continuous food troughs were attached to the cage fronts, and automatic water cups assured continuous access to food and water. Commercial rations were fed. Water was pumped from a deep well. Sexual maturity occurred between 18 and 21 weeks of age, when males weighed about 5.5 lb (2.5 kg) and females about 3.5 lb (1.5 kg).

The experiment was ended during week 45 when survivors were killed for study. Birds that died were examined within 10 hours of death for abnormalities of hearts, livers, spleens, kidneys, gonads, adrenals, and gastro-intestinal

心理學案例研究(3/5)

1975年發表在Science的心理學文章長這樣:

(12). In 10 of 12 paired MRF samples collected, the concentration of protein during REM sleep was significantly higher than that during awake periods (paired t-test $= 3.94$, $P < .001$). Furthermore, the increases of hippocampal proteins were always associated with increases in REM sleep. These results are consistent with the possibility that neuronal activity in the MRF and hippocampus during REM sleep is associated with high concentrations of extracellular proteins. These cyclic changes may simply reflect an increase in cell firing, which generally increases in REM sleep (13), or may indicate a special function of the proteins related to awake and sleep states.

An essential question concerns the source of the perfusate proteins. These proteins might be released from synaptic endings in a manner similar to that for dopamine-β-hydroxylase (5) or other products of the exocytosis process. Polypeptide modulators or neurotransmitters may be present. Alternatively, the proteins may be general secretory products of neurons or glial cells. In view of the amount of protein obtained, highly active synthetic processes seem implicated. These proteins probably arise from a variety of sources. The significant point, however, is that the protein concentrations vary in relation to REM state. Our studies provide further evidence that the push-pull cannula technique is well suited for the examination of the brain's extracellular environment. This procedure should further our understanding of the neurochemical basis of behavioral states.

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1. R. R. Drucker-Colín, J. A. Rojas-Ramírez, J. Vera-Trueba, C. Monroy-Ayala, R. Hernández-Peón, *Brain Res.* 23, 269 (1970); R. R. Drucker-Colín, *ibid.* 56, 123 (1973).
2. R. D. Myers and L. G. Sharpe, *Science* 161, 572 (1968); T. L. Yaksh and R. D. Myers, *Am. J. Physiol.* 222, 503 (1972).
3. G. A. Schoenenberger, L. B. Cueni, M. Monnier, A. M. Hatt, *Pfluegers Arch.* 338, 1 (1972).
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6. G. L. Miller, *Anal. Chem.* 31, 964 (1959).
7. Four cats were killed and the midbrain tegmentum was removed; 25 mg (2.3 mm³) of tissue was analyzed for total soluble protein as follows. The tissue was homogenized in tris(hydroxymethyl)aminomethane, pH 7.3, then centrifuged at 100,000g for 30 minutes. The protein content of the supernatant was assayed by the Lowry method.
8. H. E. Whipple, *Ann. N.Y. Acad. Sci.* 121, 305 (1963).
9. W. F. Blatt, M. P. Feinberg, H. P. Hopfenberg, C. A. Saravis, *Science* 150, 224 (1965). Ultrafiltration was accomplished by passing perfusate samples through an Amicon microultrafiltration system model 8 MC. Diaflo ultrafilters below 20,000 molecular weight were of the UM series, those between 20,000 and 30,000 were of the PM series, and those above 30,000 were of the XM type.
10. C. A. Williams, Jr., and P. Grabor, *J. Immunol.* 74, 158 (1955); *ibid.*, p. 397.
11. I. Oswald, *Nature (Lond.)* 223, 893 (1969).
12. In these experiments, 24 paired samples (12 when the animals were awake and 12 during REM sleep) were collected from eight cats. Each pair of samples was obtained from the same animal on the same day. The behavioral states were monitored electroencephalographically. Protein concentrations were compared by means of paired t-tests.
13. J. A. Hobson, *Adv. Sleep Res.* 1, 217 (1974).
14. Supported by NIMH grants MH 19691 (to C.W.C.) and MH 12526 (to J.L.M.). R.R.D.C. was supported by grant 72-552 from the Foundations' Fund for Research in Psychiatry. We thank G. A. Granger for his invaluable help.
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9 October 1974

Meaning in Visual Search

Abstract. *Viewers briefly glimpsed pictures presented in a sequence at rates up to eight per second. They recognized a target picture as accurately and almost as rapidly when they knew only its meaning given by a name (for example, a boat) as when they had seen the picture itself in advance.*

When we look around, our glance shifts rapidly from point to point. The average fixation lasts a mere ⅓ second. Moreover, when the observer is moving through an unfamiliar environment, each such glance may contain something new. We know that when novel scenes (pictures) are viewed at that rate, half of them do not even look familiar a few minutes later (1). Each glance is thus too brief to assure memory for what is seen. What other function (2) might such brief fixations serve? When the viewer can anticipate either what is important to see or what he is likely to see, a brief glimpse may be sufficient to confirm or refute that expectation.

Two questions were addressed in the study reported here. (i) Can an observer detect an expected scene even when it is presented so briefly that it would not otherwise be remembered? (ii) If so, what sort of advance information about a scene is required for the observer to spot it? If a viewer knew exactly what the target of his search looked like, he might select it by making a direct visual match. However, if he had only general information about the target (its meaning), each potential target would have to be recognized and categorized before selection. Such a search might be expected to proceed more slowly and less accurately than one based on visual appearance per se (3). In the study reported here observers were able to pick out an anticipated scene from a set of others presented at rates even higher than those of normal eye refixations, rates at which memory for unanticipated scenes is very poor. Even more surprisingly, foreknowledge of meaning in the form of a general name permitted as accurate and almost as rapid selection as foreknowledge of exact appearance. These results suggest that we can scan our environment in brief glimpses, looking not only for particular visual patterns, but for their meanings.

A succession of rapid glances around the environment was simulated by presenting observers with a sequence of photographs of various scenes and objects (1). One practice and eight test sequences of 16 color pictures were shown on an L-W cine projector to two groups of 24 college students. The observer was instructed to look for a particular picture; if he saw it, he responded by pressing a lever that stopped the projector. In one group, the observer was shown the target picture before viewing each sequence. In the other group, the observer was only given a name for the picture he was to look for (for example, a boat, two men drinking beer, a child and butterfly). The names were brief descriptions of the main objects or events in the scene; colors and shapes were never specified directly. In all other respects, the procedure was identical for both groups.

Each observer viewed the practice sequence at a rate of 250 msec per picture and two of the eight test sequences at each of four rates: 125, 167, 250, or 333 msec per picture. The order of rates was permuted across observers.

The target picture was the ninth, tenth, or eleventh picture in the sequence. For each group of 24 observers, the four orders of rates, two different orders of pictures, and three orders of target positions were factorially combined.

The upper curves in Fig. 1 show the proportion of correct responses to the target in either group at each rate. Each point is based on 48 trials. Errors for both groups were rare except at eight pictures per second; the difference between the groups was not significant. Errors were of two kinds: misses (0.07 of trials) and anticipations (0.05). The false alarm rate per picture, estimated by dividing the proportion of anticipations by the average number of pictures before the target, was less than 0.01. Most of the misses (0.77) occurred at the highest rate of presentation, whereas anticipations were equally likely at all rates. The overall mean response time, measured by the elapsed frames between the onset of the picture and the observer's response, was 531 msec for the picture target group and 563 msec for the name target group ($P < .05$, Mann-Whitney); the difference was in the same direction at each of the four rates.

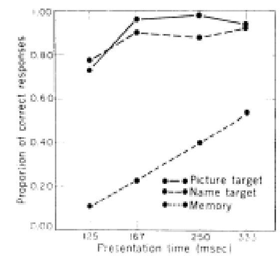

Fig. 1. Detection probability in two target conditions as a function of the rate of presentation (logarithmic scale). Recognition memory for the same pictures, measured in an earlier experiment (1), is shown for comparison.

To detect a target defined by its meaning rather than by a specific visual pattern, the observer presumably had to identify each scene (4). Since more than 70 percent of the targets were detected with a 125-msec exposure, the implication is that 70 percent would also be identified when the observer was not searching, but was simply looking at the pictures. One might expect identified pictures to be remembered, since several experiments have demonstrated that memory for pictures is remarkably accurate (5). However, in those experiments pictures were presented for at least 1 second each.

Memory for the pictures used in this study was measured in an earlier study (1) by giving a yes-no test of recognition memory immediately after each sequence. The observer watched the sequence but did not look for a particular picture. The results, omitting the easy-to-remember last picture in each sequence and corrected for guessing (0.03 false yeses), are shown in the lower curve of Fig. 1. Each point is based on 960 responses.

The difference between detection and memory is striking and highly significant. The low probability of memory under conditions of presentation that allow efficient detection by name implies that many of the pictures, although briefly identified, are immediately forgotten. One's excellent memory for pictures evidently requires not only identification but something else as well—presumably a further period of consolidation. For the pictures used in this study, the median exposure duration required for identification was less than 125 msec, whereas the median duration needed for retention was more than 300 msec (6).

To return to the questions posed at the beginning, one does not need to know exactly what a thing will look like to detect it in a ⅛-second glimpse. In fact, knowing the exact appearance of a target was little better than knowing only its general meaning, which suggests that a scene is processed rapidly to an abstract level of meaning before intentional selection occurs (7). Unselected scenes, although momentarily understood, will be forgotten unless there is uninterrupted time for further consolidation. The ⅓-second length of an average glance seems to be a compromise between the need to scan the environment rapidly for significant objects or events to which one will immediately respond, and the need to retain some knowledge of what one has seen.

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References and Notes

1. M. C. Potter and E. I. Levy, *J. Exp. Psychol.* 81, 10 (1969).
2. A major function of perception is to construct a running model of the immediate spatial environment. To do that one extracts first-order and higher-order invariants detected as one glances around [see J. J. Gibson, *The Senses Considered as Perceptual Systems* (Houghton Mifflin, Boston, 1966)]. This report, in contrast, is concerned with the perception of novel information in a glance.
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4. An alternative possibility is that having a target in mind selectively facilitated analysis of a matching scene. Although plausible for a target pictured in advance, that hypothesis is much less plausible for a name target having unpredictable visual features. Congruent with the inference that viewers identified pictures before selection, observers frequently reported that they understood more pictures than they could remember.
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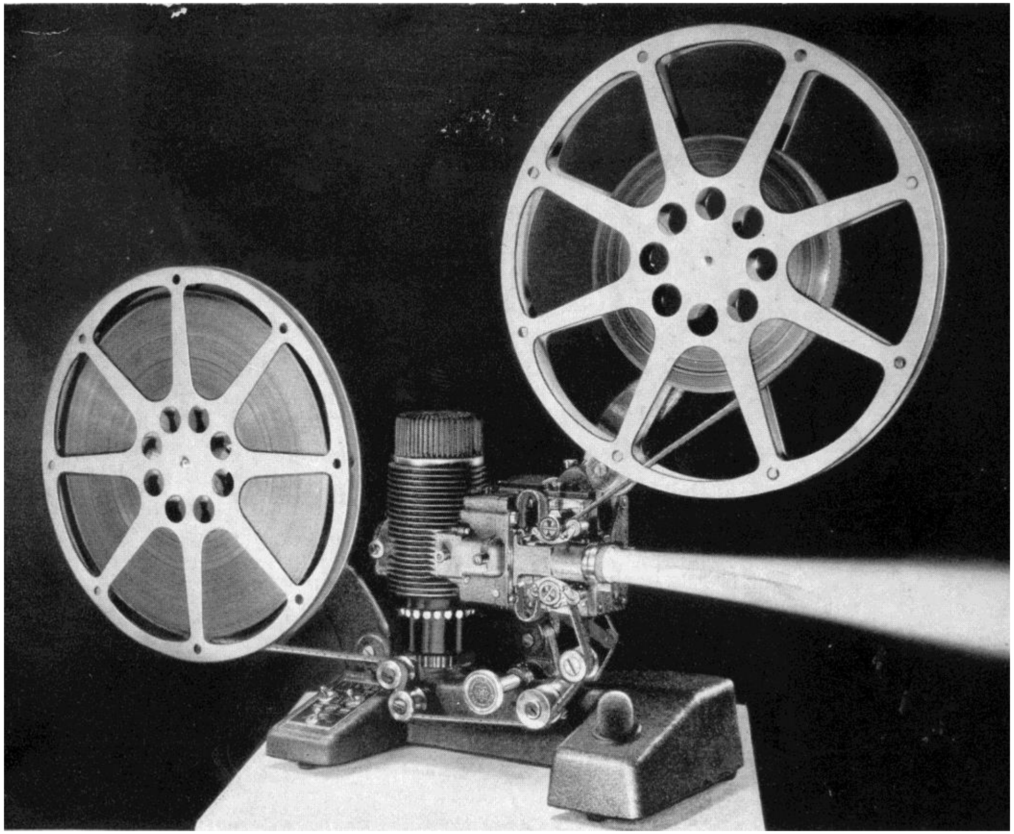
6. Additional evidence for the time course of identification and consolidation is considered by M. C. Potter (in preparation). As has long been known, recognition of a briefly presented visual stimulus can be blocked by a following masking pattern. I modified the sequential presentation used here by presenting each picture in isolation for 50 to 120 msec, preceded and followed by a mask composed of a random aggregate of colored fragments. When pictures were in view for as long as 120 msec, the random mask ceased to be effective in disrupting memory. But when the mask is itself another picture, as in the study reported here, it is capable of disrupting memory even when the preceding picture was in view for as long as 500 msec (1). It is proposed that a following picture, but not a familiar, meaningless mask, interrupts consolidation.
7. A "meaningless" stimulus, such as a nonsense figure produced by constrained random processes, is one with an impoverished abstract interpretation. Although such patterns may be easy to distinguish when presented side by side, they all mean "the same thing." If selection is based primarily on meaning, it is no suprise that such figures are difficult to recognize as familiar unless they happen to look a little like a real object. How initially meaningless patterns such as x-ray photographs and micrographs come to acquire distinctive meaning has been considered by E. J. Gibson [*Principles of Perceptual Learning and Development* (Appleton-Century-Crofts, New York, 1969)].
8. Supported by Grant and Spencer Foundation grants to H.-L. Teuber and NIMH grant MH-13988-01 to M.C.P. I thank R. M. Held for comments and E. I. Blum for assistance.

27 September 1974

心理學案例研究(4/5)

1964的投影技術

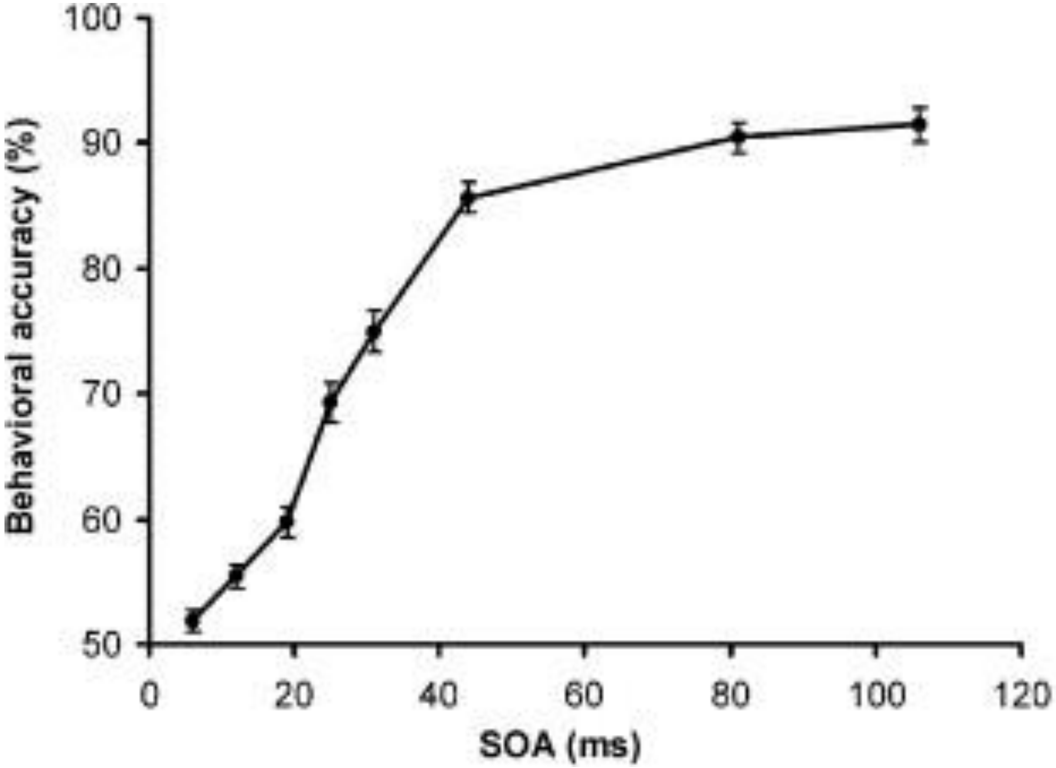
1975的投影技術



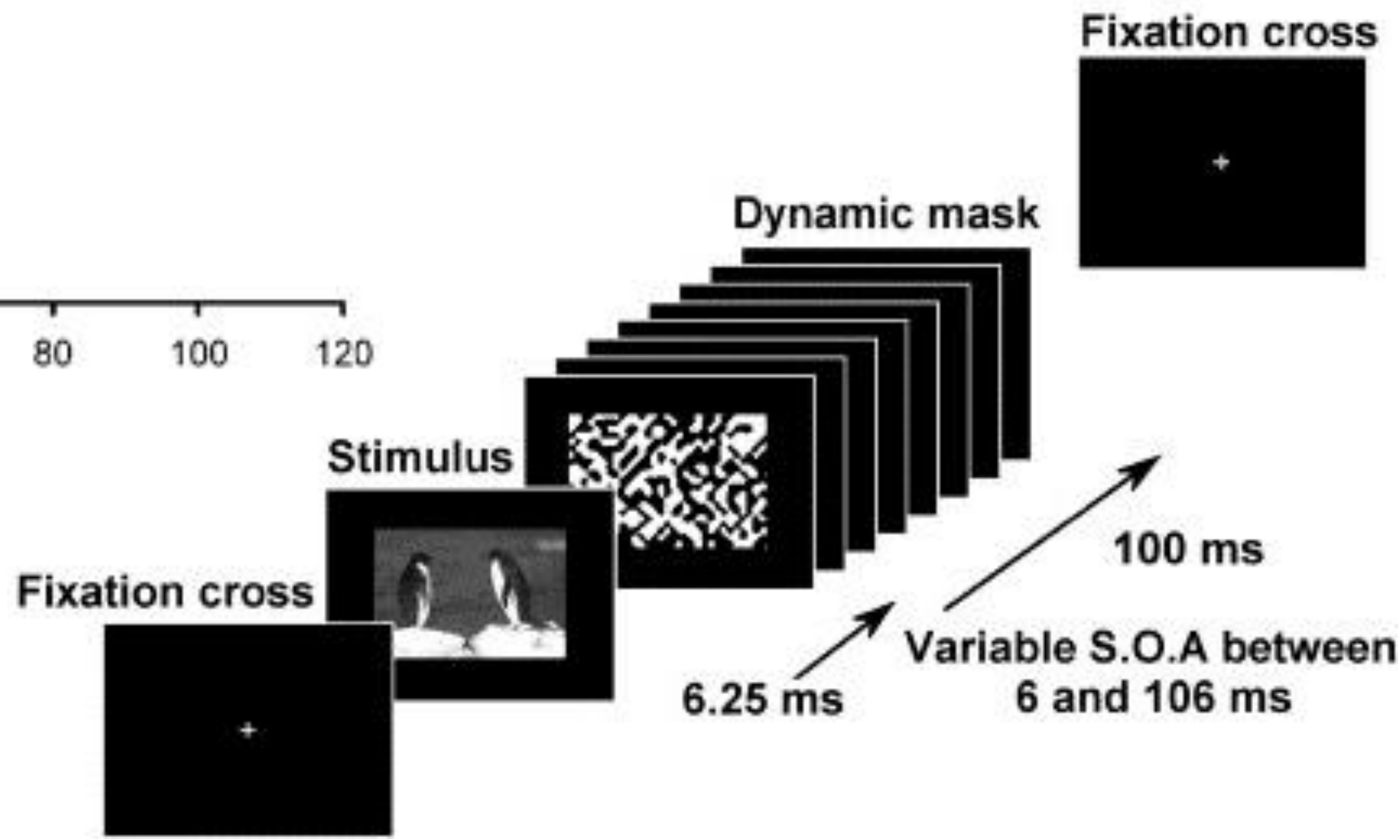
- 小故事大啟示:手邊有什麼資源就做什麼研究!

心理學案例研究(5/5)

人類偵測動物只要看<0.015秒!?



[Bacon-Mace et al., 2005]



我們來研究看看!

實驗開發環境的比較(1/2)

Excel+PowerPoint: 太low了不想討論

E-Prime:圖形介面開發; $$$

Matlab+Psychtoolbox:需寫程式;$$$+Free

Python+PsychoPy: 圖形/程式皆可;Free+Free

...

這次很好選?

實驗開發環境的比較(2/2)

PsychoPy 1.85.0後開始支援開發網頁實驗

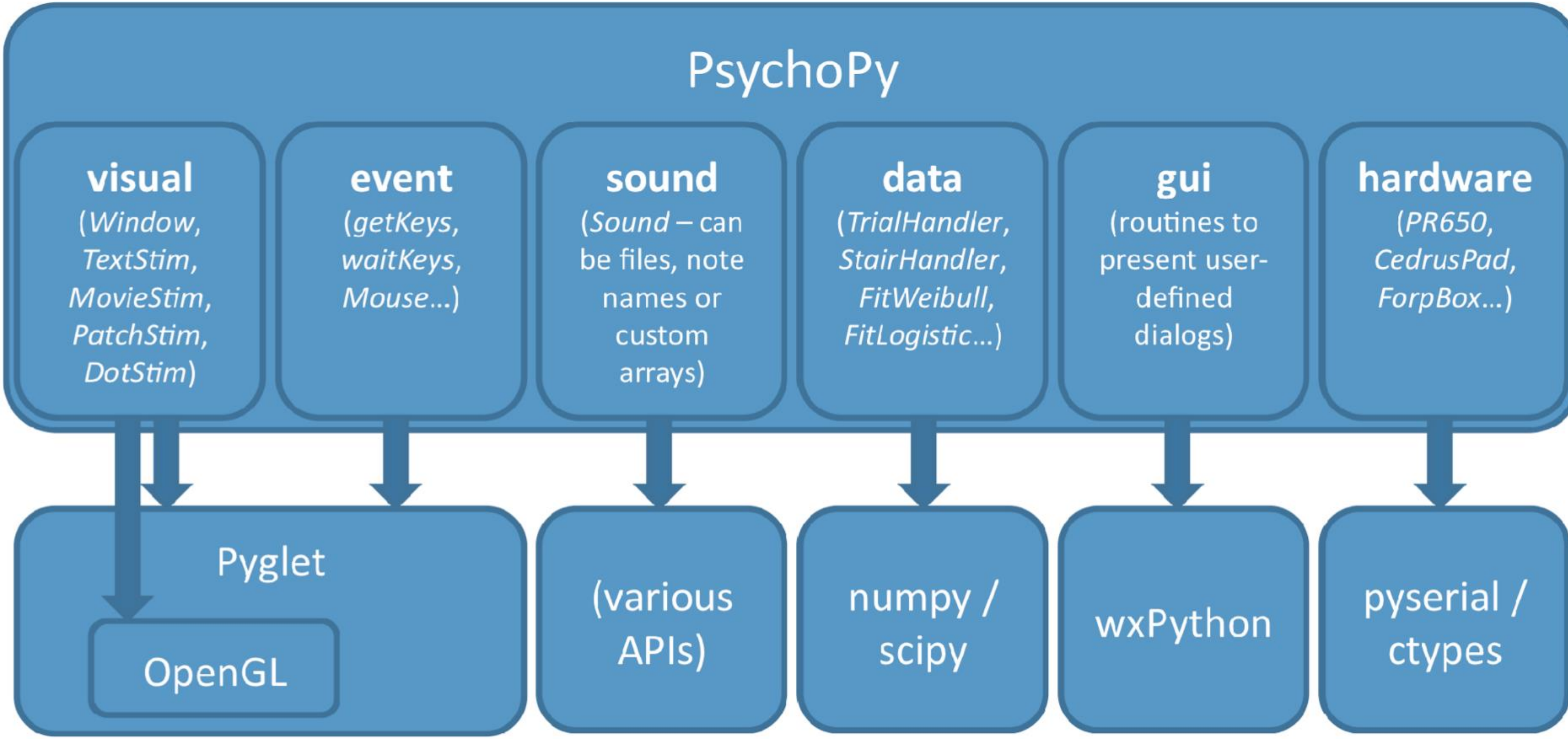
	PsychoPy	Vision Egg	Psychtoolbox	Presentation
Free	✓✓	✓✓	✓ (requires Matlab)	x
Full source code	✓✓	✓✓	✓ (none for Matlab)	x
Platform independent	✓✓	✓✓	✓✓	x
Usability	✓✓	✓	✓✓	✓✓
Automated Calibration	✓✓✓	x	✓	x
Stimuli in realtime	✓✓	✓✓	✓	x
Hardware interfaces	✓✓	✓✓	✓✓	✓✓
Community size	✓†	✓✓	✓✓✓	✓✓

†It should be noted that, although the community for PsychoPy itself is relatively small, there is a very large community using Python.

Peirce, 2007

PsychoPy的架構

新版已植基於Python 3的環境



Peirce, 2009

PsychoPy資源

PsychoPy可從這裡下載

這和這是介紹PsychoPy的論文

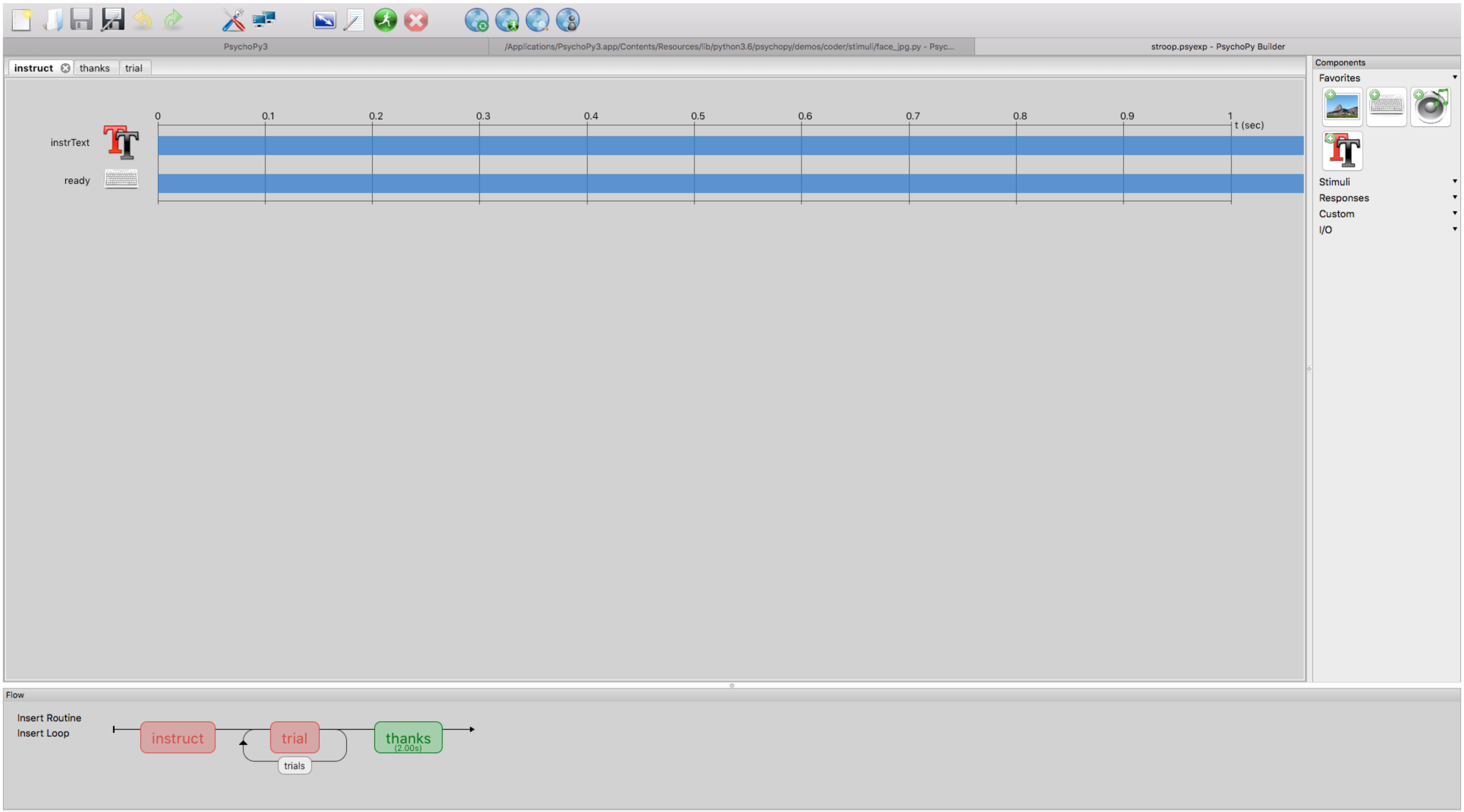
PsychoPy作者自拍的教學影片

PsychoPy的詳細使用說明書

PsychoPy所提供的函數總覽

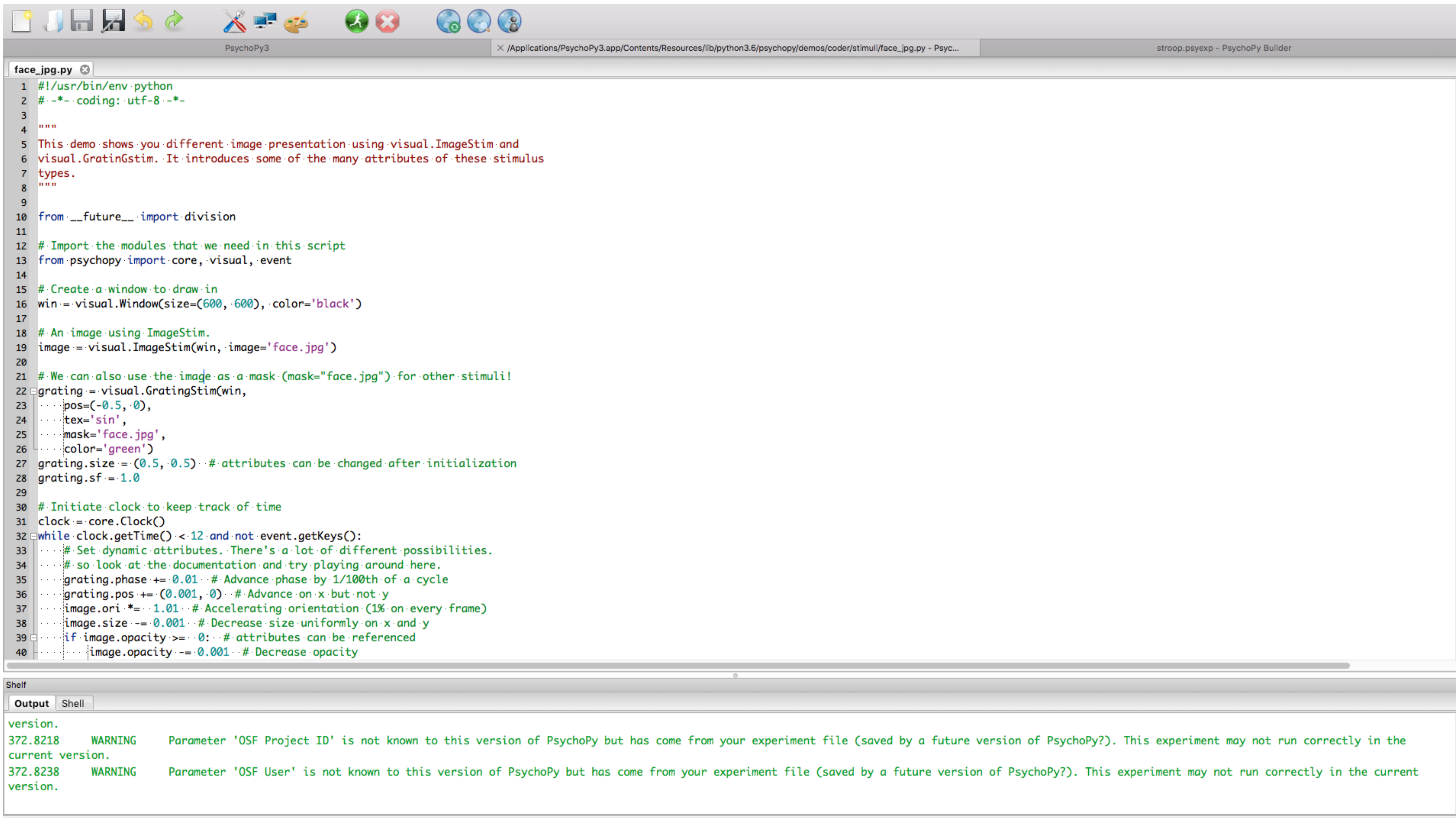
PsychoPy圖形介面

稱為Builder



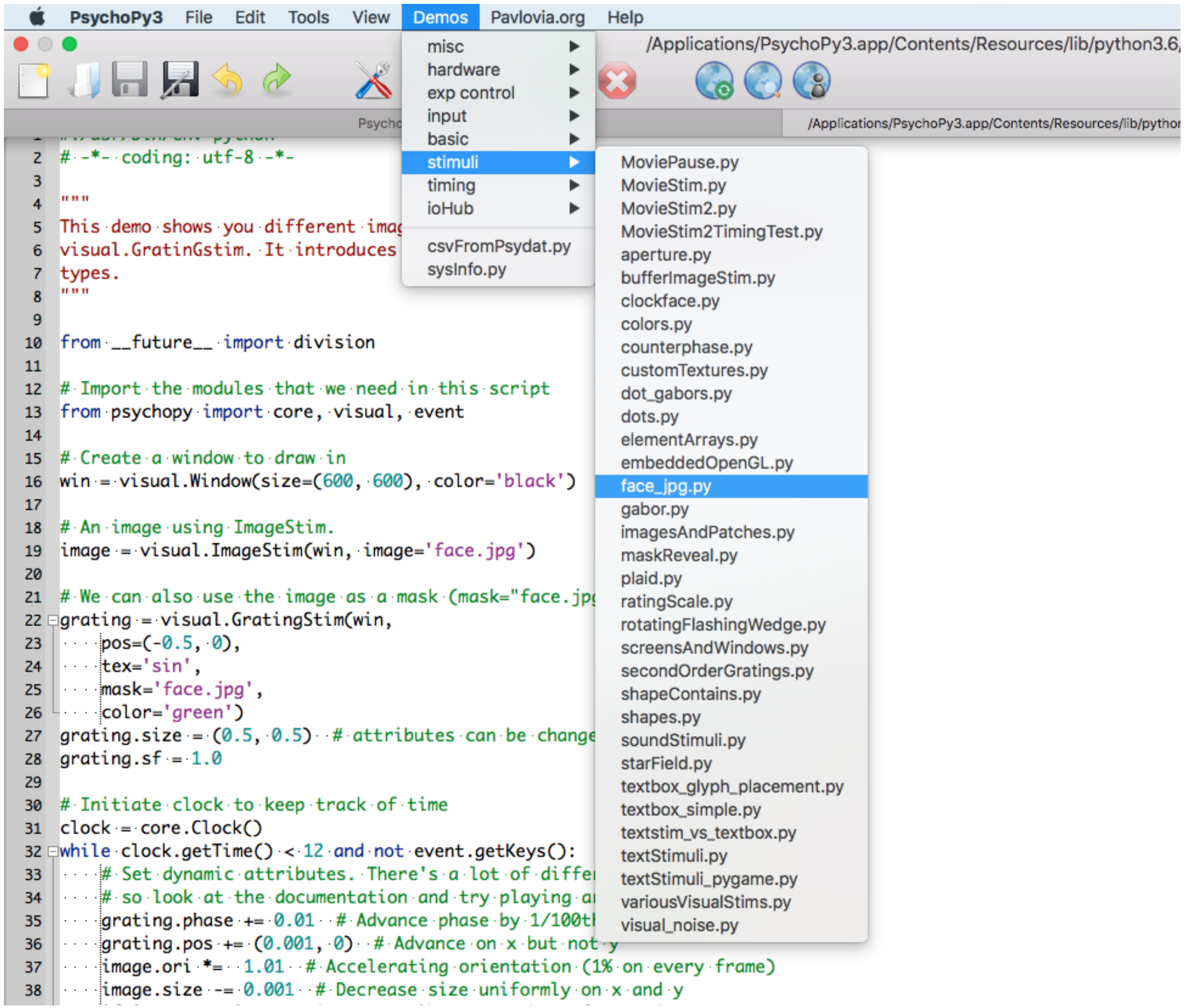
PsychoPy程式介面

稱為Coder



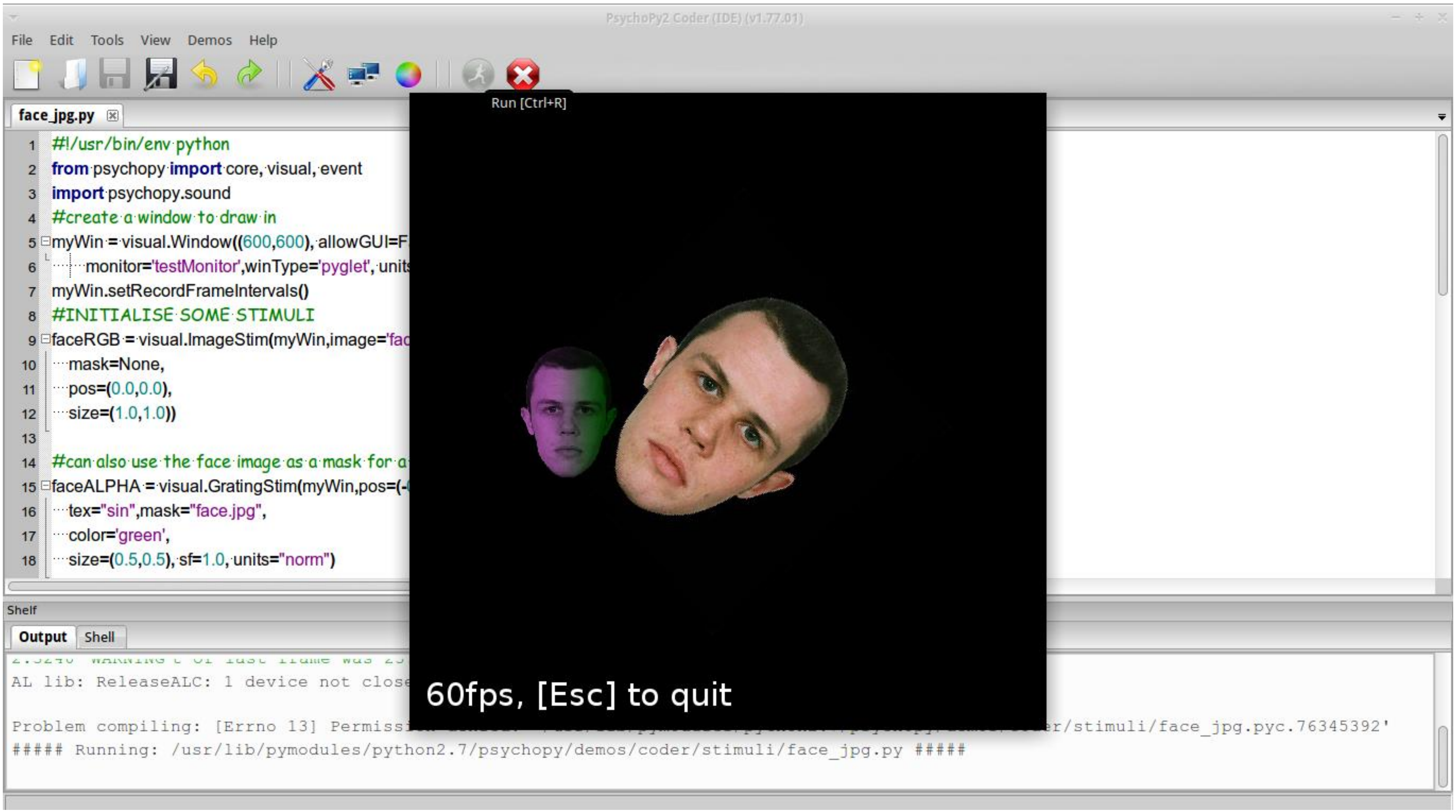
PsychoPy範例程式(1/2)

Demos是可以學到很多東西的好地方:



PsychoPy範例程式(2/2)

測試一下face_jpg.py



今天單機實驗要介紹的四個程式

學會了功力大增

1. animal_detection_txt1: Builder文字版

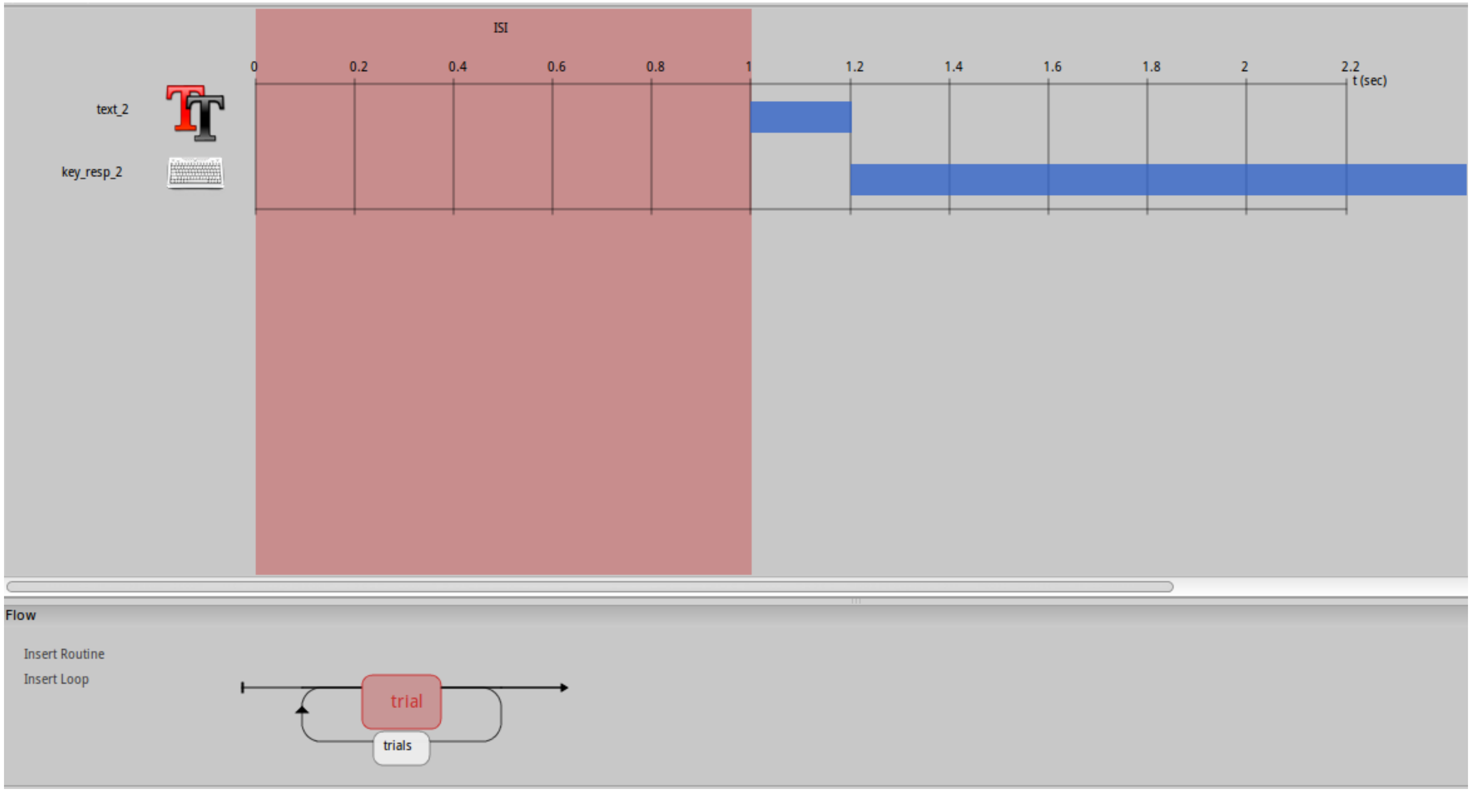
2. animal_detection_pic1: Builder圖形版

3. animal_detection_txt2: Coder文字版

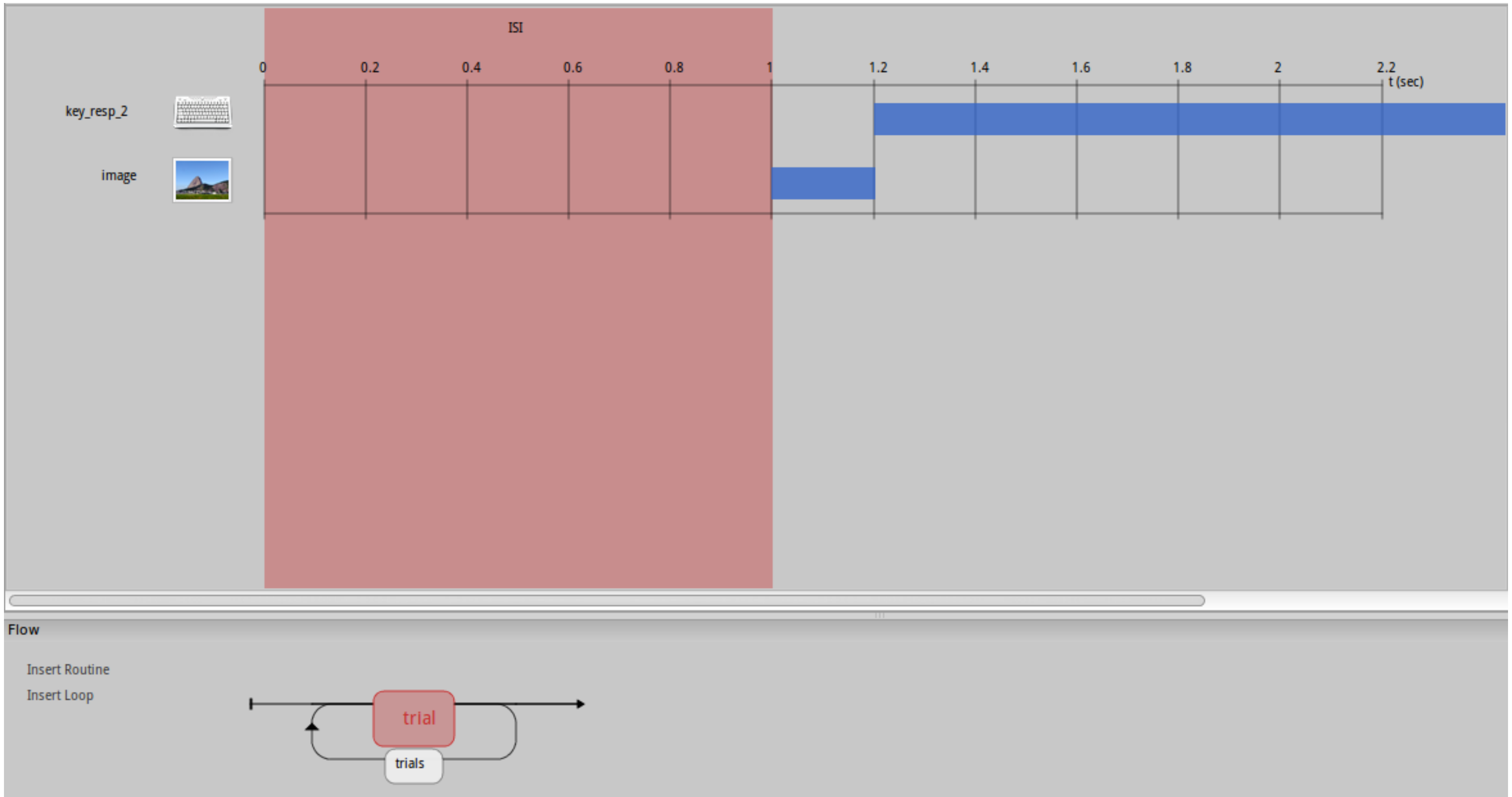
4. animal_detection_pic2: Coder圖形版

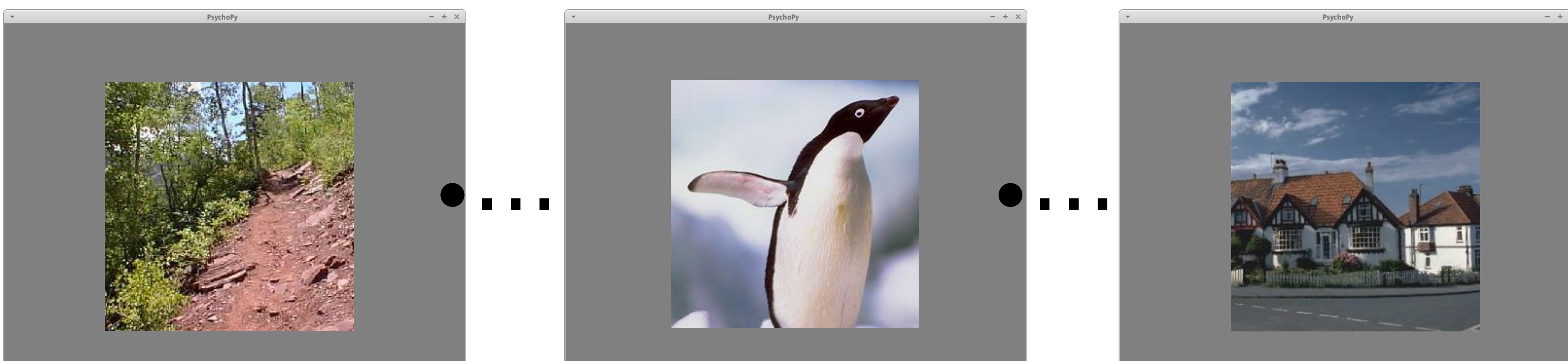
沒學會其實也不會怎麼樣。
大不了這堂課被當掉!?

animal_detection_txt1



animal_detection_pic1



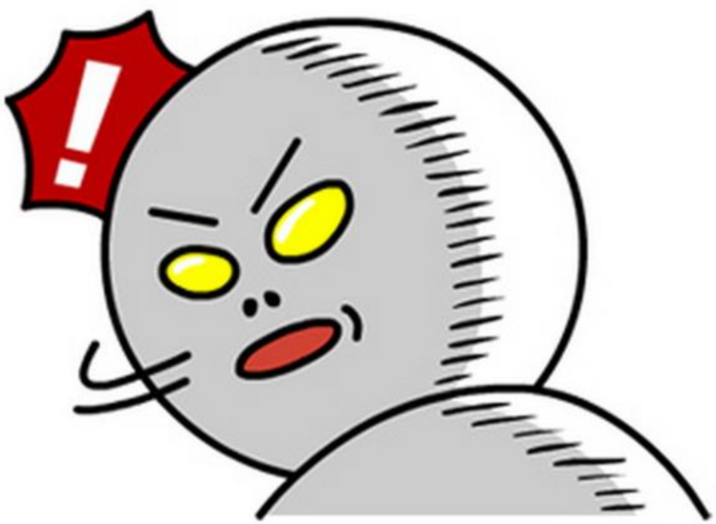


Builder的問題

和E-Prime一樣要手動建立實驗刺激表

時間軸是採絕對而非相對時間，微調困難

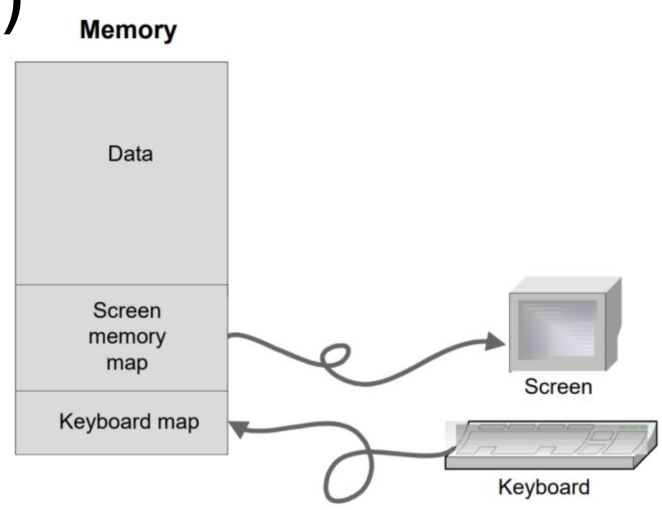
難以用來建造較複雜的實驗程式



Coder，你好！

```
from psychopy import visual,core,event
w=visual.Window(size=[800,600])
word=visual.TextStim(w,text='Hello, Coder!')
word.draw()
w.flip()
core.wait(2)
visual.TextStim(w,text='Press [y] or [n]!').draw()
w.flip()
print(event.waitKeys(keyList=['y','n']))
```

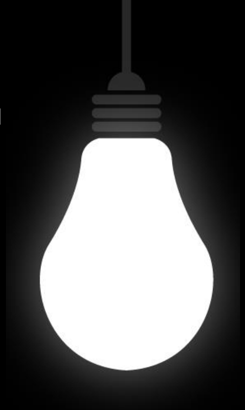
更多PsychoPy模組介紹看這邊



animal_detection_txt2

```
# -*- coding: utf-8 -*-
from psychopy import core,visual,event
import numpy as np
words=['小貓','小狗','貓熊','桌子','手機','袋子']
corAns=np.array(['y']*3+['n']*3)
ACC=np.array([]); RT=np.array([])
w=visual.Window(size=[800,600])
for i in range(2): #blocks
  keys=np.array([])
  trials=np.random.permutation(range(len(words)))
  for j in trials:
    core.wait(1)
    visual.TextStim(w,text=words[j],font="Songti SC").draw();
    w.flip(); core.wait(0.2); w.flip()
    r=event.waitKeys(timeStamped=core.Clock())
    keys=np.append(keys,r[0][0]); RT=np.append(RT,r[0][1])
  ACC=np.append(ACC,keys==corAns[trials])
np.savetxt('data.txt',np.vstack([ACC,RT]).T,['%d','%f'])
```

animal_detection_pic2

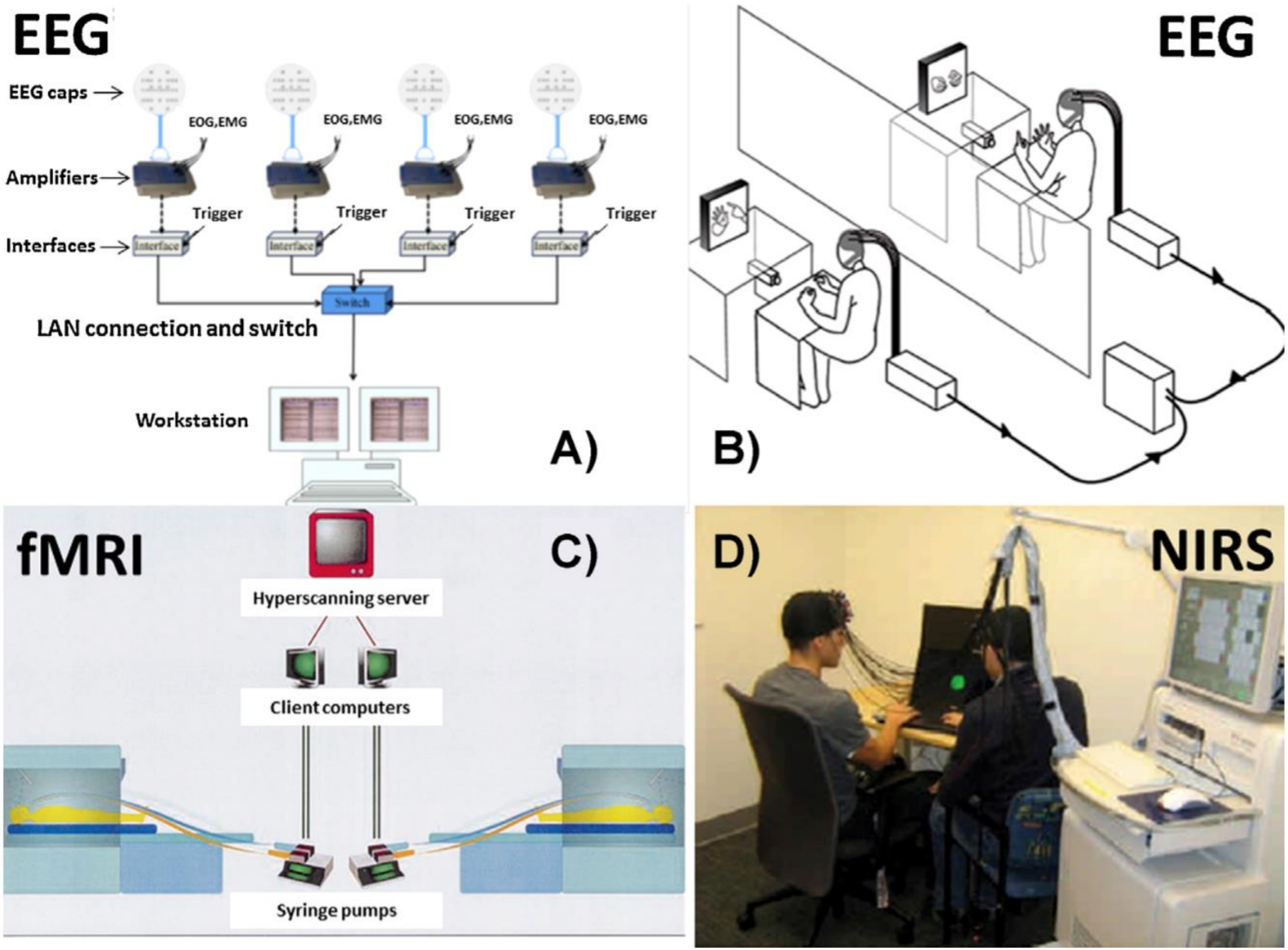


```
from psychopy import core,visual,event
import numpy as np, glob as gb
f=[gb.glob('T*.jpg'),gb.glob('D*.jpg')] #files
f=np.append(np.random.choice(f[0],3),np.random.choice(f[1],3))
corAns=np.array(['y']*3+['n']*3)
ACC=np.array([]); RT=np.array([])
w=visual.Window(fullscr=True)
for i in range(2): #blocks
    keys=np.array([])
    trials=np.random.permutation(range(len(f)))
    for j in trials:
        core.wait(1)
        visual.ImageStim(w,f[j],units='pix',size=[512,512]).draw()
        w.flip(); core.wait(0.2); w.flip()
        r=event.waitKeys(timeStamped=core.Clock())
        keys=np.append(keys,r[0][0]); RT=np.append(RT,r[0][1])
    ACC=np.append(ACC,keys==corAns[trials])
np.savetxt('data.txt',np.vstack([ACC,RT]).T,['%d','%f'])
```

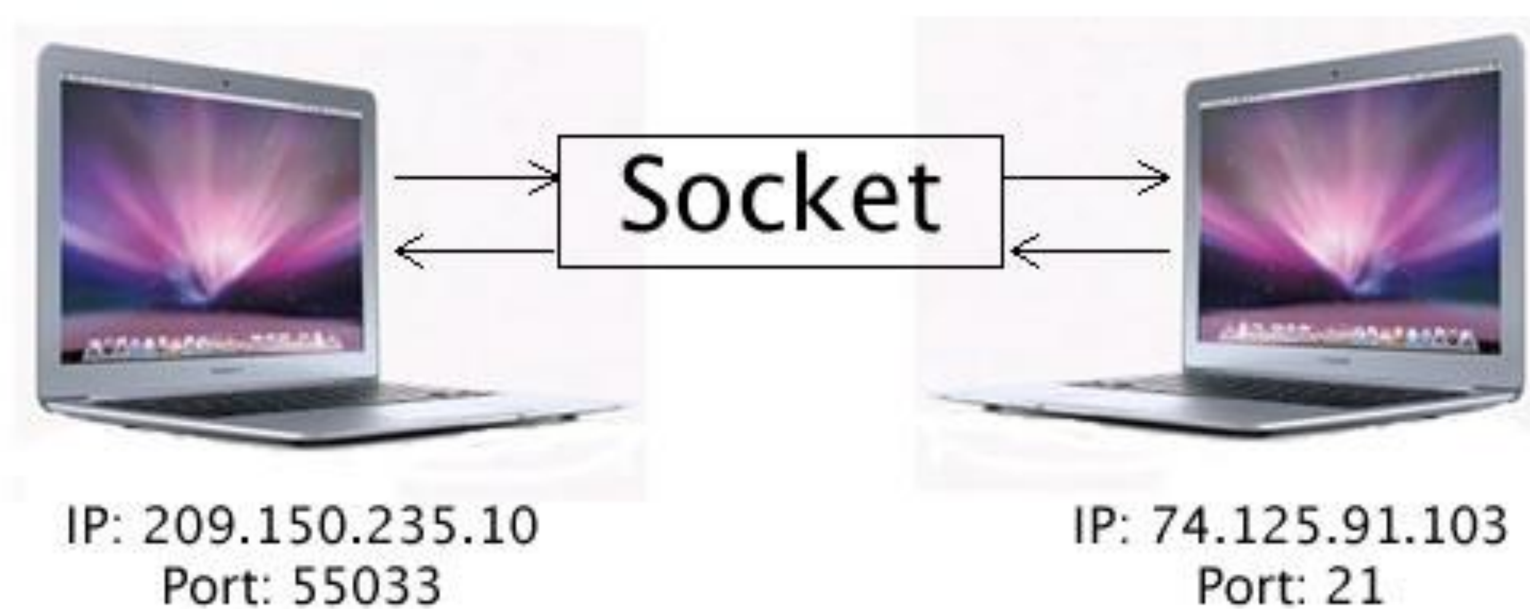
網路實驗程式
(TCP/IP Socket)

心理學案例研究

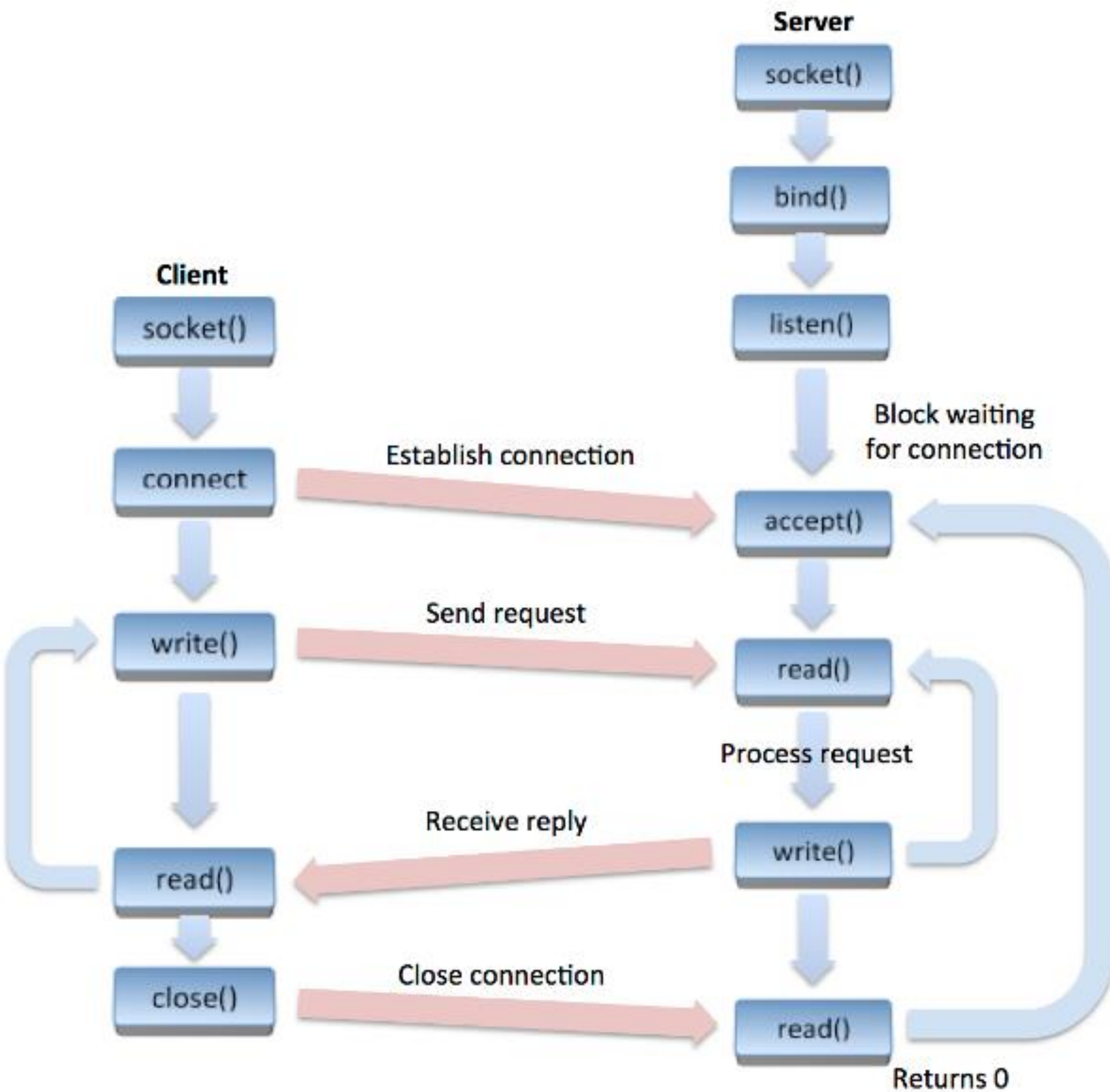
社會(認知)神經科學的研究需要網路程式



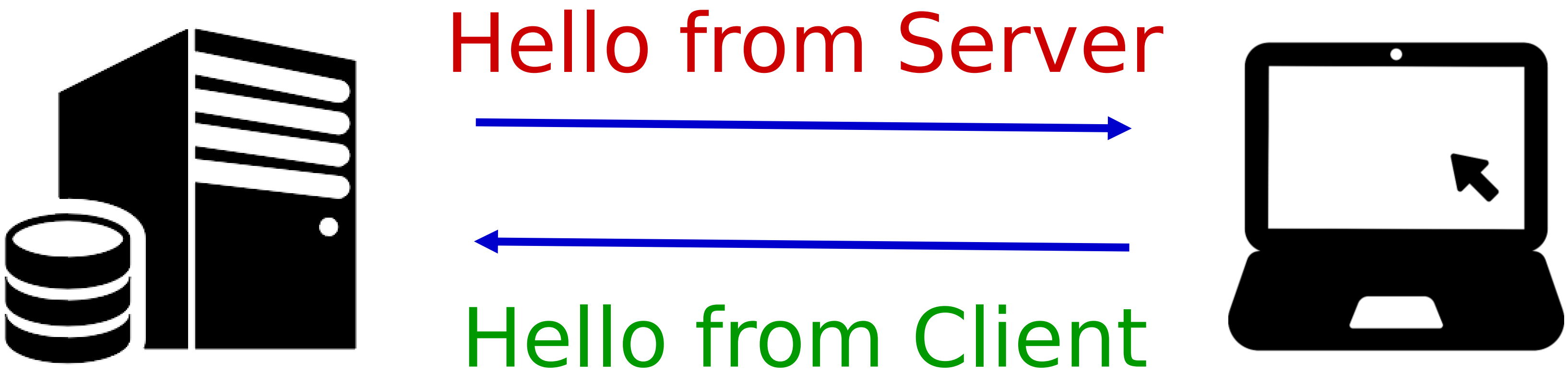
Socket?



Socket!

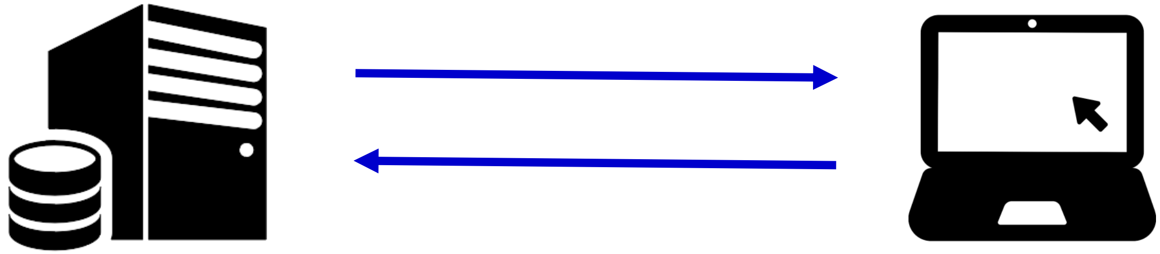

Server
socket()
bind()
listen()
Block waiting
for connection
accept()
read()
Process request
write()
read()
Returns 0
Client
socket()
connect
write()
read()
close()
Establish connection
Send request
Receive reply
Close connection

網路程式ㄅㄆㄇ: client.py




```python
import socket
code='utf-8'
c=socket.socket(socket.AF_INET,socket.SOCK_STREAM)
c.connect(('localhost', 1234)) # Server IP=localhost
c.sendall('Hello from client!'.encode(code))
print(c.recv(1024).decode(code)) # up to 1024 bytes
c.close()
```

網路程式ㄅㄆㄇ: server.py



```
import socket
code='utf-8'
s=socket.socket(socket.AF_INET,socket.SOCK_STREAM)
s.setsockopt(socket.SOL_SOCKET,socket.SO_REUSEADDR,1)
s.bind(('localhost', 1234)) # Srvr IP=localhost, port =1234
s.listen(1) # max number of clients
s.settimeout(60) # max waiting time=60s
for i in range(3):
    (c,adr)=s.accept(); print('Client: ',i,adr)
    msg=c.recv(1024) # up to 1024 bytes
    print(msg.decode(code))
    c.sendall((str(i)+' from server!').encode(code))
s.close()
```

今天網路實驗要介紹的四個程式

學會了指導教授會對你刮目相看(?)

server_txt:動物文字偵測server版

client_txt:動物文字偵測client版

server_pic:動物圖片偵測server版

client_txt: 動物圖片偵測client版

這次由server端而非電腦亂數來
決定client端看到什麼文字/圖片!

server_txt (1/2)

```
from psychopy import core,visual,event
import numpy as np,socket
code='utf-8'; nTrials=6
words=['cat','dog','panda','table','iphone','bag']
instruct='Press 1, 2, ..., 6 to pick a word:\n\n'
instruct=instruct+', '.join(words)
corAns=np.array(['y']*3+['n']*3)
ACC=np.array([]); RT=np.array([])
w=visual.Window(size=[800,500],color=[-1,-1,-1])
visual.TextStim(w,text='Waiting for a client').draw()
w.flip() # show init screen
s=socket.socket(socket.AF_INET,socket.SOCK_STREAM)
s.setsockopt(socket.SOL_SOCKET,socket.SO_REUSEADDR,1)
s.bind(('localhost', 1234))
s.listen(1) # allow 1 client
(c,adr)=s.accept()
```

server_txt (2/2)

```
for i in range(nTrials):
  visual.TextStim(w,text=instruct).draw()
  w.flip() # show choices
  key=event.waitKeys(keyList=map(str,range(1,7))) # allow 1-6
  w.flip() # clear screen
  idx=int(key[0])-1 # choice as the array index
  c.sendall((corAns[idx]+words[idx]).encode(code)) # like 'ycat'
  visual.TextStim(w,text='Waiting for the client').draw()
  w.flip() # show waiting
  print(c.recv(1).decode(code)) # get a response from the client
s.close()
```

client_txt

```
from psychopy import core,visual,event
import numpy as np,socket
code='utf-8'; nTrials=6
ACC=np.array([]);
w=visual.Window(size=[800,400])
visual.TextStim(w,text='Waiting for the server').draw()
w.flip() # show init screen
c=socket.socket(socket.AF_INET,socket.SOCK_STREAM)
c.connect(('localhost', 1234)) # connect to the server
for i in range(nTrials):
  msg=c.recv(1024).decode(code) # like ‘ycat’
  visual.TextStim(w,text=msg[1:]).draw()
  w.flip() # show the received word
  key=event.waitKeys(keyList=['y','n']) # ask animal or not
  c.sendall(key[0].encode(code) ) # respond back to the server
  ACC=np.append(ACC,key[0]==msg[0]) # correct?
c.close()
print(np.mean(ACC)) # show accuracy
```

server_pic (1/2)

```
from psychopy import core,visual,event
import numpy as np,glob as gb,socket
code='utf-8'; nTrials=6
instruct='Press 1, 2, ..., 6 to pick a picture:\n\n'
f=[gb.glob('T*.jpg'),gb.glob('D*.jpg')] # picture files
f=np.append(np.random.choice(f[0],3),np.random.choice(f[1],3))
corAns=np.array(['y']*3+['n']*3)
w=visual.Window(size=[800,500],color=[-1,-1,-1],units=norm)
visual.TextStim(w,text='Waiting for a client').draw()
w.flip() # show init screen
Imgs=[] # list of 6 images
for i in range(len(f)):
  (x,y)=(-.75+i*.3,-.2)
  imgs.append(visual.ImageStim(w,f[i],size=.3,pos=(x,y)))
s=socket.socket(socket.AF_INET,socket.SOCK_STREAM)
s.setsockopt(socket.SOL_SOCKET,socket.SO_REUSEADDR,1)
s.bind(('localhost', 1234))
s.listen(1) # allow 1 client
(c,adr)=s.accept()
```

server_pic (2/2)

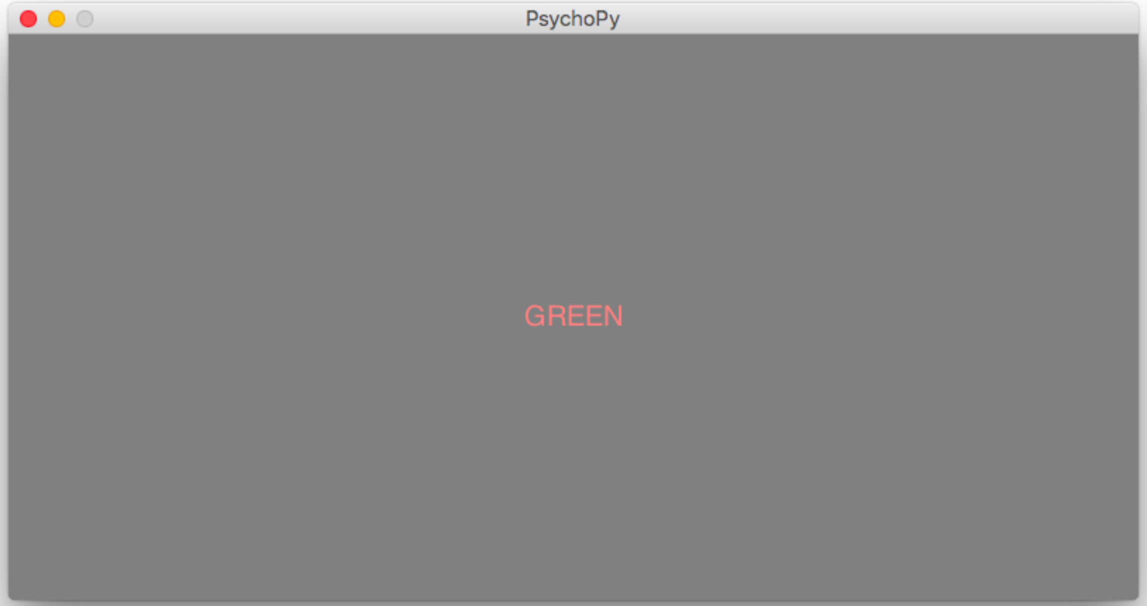
```
for t in range(nTrials):
  visual.BufferImageStim(w,stim=imgs).draw()
  visual.TextStim(w,text=instruct).draw()
  w.flip() # show choices
  key=event.waitKeys(keyList=map(str,range(1,7))) # allow 1-6
  w.flip() # clear screen
  idx=int(key[0])-1 # choice as the array index
  with open(f[idx],'rb') as file:
    data=file.read() # read in pic file
  c.sendall((corAns[idx]+str(len(data))).encode(code))#ans+psize
  c.sendall(data) # send pic file to the client
  visual.TextStim(w,text='Waiting for the client').draw()
  w.flip() # show waiting
  print(c.recv(1).encode(code)) # get a response from the client
s.close();
```

client_pic

```
from psychopy import core,visual,event
import numpy as np,glob as gb,socket
w=visual.Window(size=[800,400],units='norm')
visual.TextStim(w,text='Waiting for the server').draw()
w.flip(); code='utf-8'; nTrials=6; ACC=np.array([]);
c=socket.socket(socket.AF_INET,socket.SOCK_STREAM)
c.connect(('localhost', 1234)) # connect to the server
for i in range(nTrials):
  msg=c.recv(6).decode(code); sz=int(msg[1:]) # pic file size
  with open('tmp.jpg','rw') as file:
    file.write(c.recv(sz)) # write received data to pic file
  visual.ImageStim(w,'tmp.jpg',size=[0.8,0.8]).draw(); w.flip()
  key=event.waitKeys(keyList=['y','n']) # ask animal or not
  ACC=np.append(ACC,key[0]==msg[0]) # correct?
  c.sendall(key[0].encode(code)) # respond back to the server
c.close()
print(np.mean(ACC)) # show accuracy
```

本週作業

開發網路版Stroop Task (.py)



1. 根據server端傳來的dictionary “word” 秀畫面

2. 人工完成8 trials的測驗並達85%以上正確率
   (下週會公告全班平均正確率與反應時間)


Game Over