

# **心理與神經資訊學**

# **(Psychoinformatics & Neuroinformatics)**

課號：Psy1007

識別碼：20710100

教室：博雅 101

時間：四 234



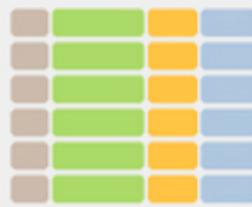
# **SQL & NoSQL 資料庫**

# SQL vs. NoSQL

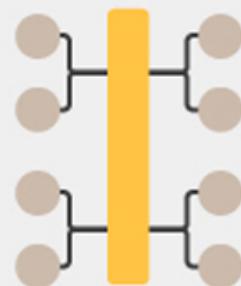
前者比較好用但處理大 / 非結構化數據需要後者

SQL Database

Relational

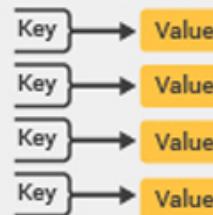


Analiticals (OLAP)



Non-SQL Database

Key-Value



Column-Family



Graph



Document



# SQL 語法 (1/3)

## SQL CHEAT SHEET <http://www.sqltutorial.org>



### QUERYING DATA FROM A TABLE

**SELECT c1, c2 FROM t;**

Query data in columns c1, c2 from a table

**SELECT \* FROM t;**

Query all rows and columns from a table

**SELECT c1, c2 FROM t**

**WHERE condition;**

Query data and filter rows with a condition

**SELECT DISTINCT c1 FROM t**

**WHERE condition;**

Query distinct rows from a table

**SELECT c1, c2 FROM t**

**ORDER BY c1 ASC [DESC];**

Sort the result set in ascending or descending order

**SELECT c1, c2 FROM t**

**ORDER BY c1**

**LIMIT n OFFSET offset;**

Skip offset of rows and return the next n rows

**SELECT c1, aggregate(c2)**

**FROM t**

**GROUP BY c1;**

Group rows using an aggregate function

**SELECT c1, aggregate(c2)**

**FROM t**

**GROUP BY c1**

**HAVING condition;**

Filter groups using HAVING clause

### QUERYING FROM MULTIPLE TABLES

**SELECT c1, c2**

**FROM t1**

**INNER JOIN t2 ON condition;**

Inner join t1 and t2

**SELECT c1, c2**

**FROM t1**

**LEFT JOIN t2 ON condition;**

Left join t1 and t2

**SELECT c1, c2**

**FROM t1**

**RIGHT JOIN t2 ON condition;**

Right join t1 and t2

**SELECT c1, c2**

**FROM t1**

**FULL OUTER JOIN t2 ON condition;**

Perform full outer join

**SELECT c1, c2**

**FROM t1**

**CROSS JOIN t2;**

Produce a Cartesian product of rows in tables

**SELECT c1, c2**

**FROM t1, t2;**

Another way to perform cross join

**SELECT c1, c2**

**FROM t1 A**

**INNER JOIN t2 B ON condition;**

Join t1 to itself using INNER JOIN clause

### USING SQL OPERATORS

**SELECT c1, c2 FROM t1**

**UNION [ALL]**

**SELECT c1, c2 FROM t2;**

Combine rows from two queries

**SELECT c1, c2 FROM t1**

**INTERSECT**

**SELECT c1, c2 FROM t2;**

Return the intersection of two queries

**SELECT c1, c2 FROM t1**

**MINUS**

**SELECT c1, c2 FROM t2;**

Subtract a result set from another result set

**SELECT c1, c2 FROM t1**

**WHERE c1 [NOT] LIKE pattern;**

Query rows using pattern matching %, \_

**SELECT c1, c2 FROM t**

**WHERE c1 [NOT] IN value\_list;**

Query rows in a list

**SELECT c1, c2 FROM t**

**WHERE c1 BETWEEN low AND high;**

Query rows between two values

**SELECT c1, c2 FROM t**

**WHERE c1 IS [NOT] NULL;**

Check if values in a table is NULL or not

# SQL 語法 (2/3)

SQL CHEAT SHEET <http://www.sqltutorial.org>



## MANAGING TABLES

```
CREATE TABLE t (
    id INT PRIMARY KEY,
    name VARCHAR NOT NULL,
    price INT DEFAULT 0
);
```

Create a new table with three columns

```
DROP TABLE t;
```

Delete the table from the database

```
ALTER TABLE t ADD column;
```

Add a new column to the table

```
ALTER TABLE t DROP COLUMN c;
```

Drop column c from the table

```
ALTER TABLE t ADD constraint;
```

Add a constraint

```
ALTER TABLE t DROP constraint;
```

Drop a constraint

```
ALTER TABLE t1 RENAME TO t2;
```

Rename a table from t1 to t2

```
ALTER TABLE t1 RENAME c1 TO c2 ;
```

Rename column c1 to c2

```
TRUNCATE TABLE t;
```

Remove all data in a table

## USING SQL CONSTRAINTS

```
CREATE TABLE t(
    c1 INT, c2 INT, c3 VARCHAR,
    PRIMARY KEY (c1,c2)
);
```

Set c1 and c2 as a primary key

```
CREATE TABLE t1(
    c1 INT PRIMARY KEY,
    c2 INT,
    FOREIGN KEY (c2) REFERENCES t2(c2)
);
```

Set c2 column as a foreign key

```
CREATE TABLE t(
    c1 INT, c1 INT,
    UNIQUE(c2,c3)
);
```

Make the values in c1 and c2 unique

```
CREATE TABLE t(
    c1 INT, c2 INT,
    CHECK(c1 > 0 AND c1 >= c2)
);
```

Ensure c1 > 0 and values in c1 >= c2

```
CREATE TABLE t(
    c1 INT PRIMARY KEY,
    c2 VARCHAR NOT NULL
);
```

Set values in c2 column not NULL

## MODIFYING DATA

```
INSERT INTO t(column_list)
VALUES(value_list);
```

Insert one row into a table

```
INSERT INTO t(column_list)
VALUES (value_list),
       (value_list), ...;
```

Insert multiple rows into a table

```
INSERT INTO t1(column_list)
SELECT column_list
FROM t2;
```

Insert rows from t2 into t1

```
UPDATE t
SET c1 = new_value;
```

Update new value in the column c1 for all rows

```
UPDATE t
SET c1 = new_value,
    c2 = new_value
WHERE condition;
```

Update values in the column c1, c2 that match the condition

```
DELETE FROM t;
```

Delete all data in a table

```
DELETE FROM t
WHERE condition;
```

Delete subset of rows in a table

# SQL 語法 (3/3)

SQL CHEAT SHEET <http://www.sqltutorial.org>



## MANAGING VIEWS

**CREATE VIEW** v(c1,c2)

**AS**

**SELECT** c1, c2

**FROM** t;

Create a new view that consists of c1 and c2

**CREATE VIEW** v(c1,c2)

**AS**

**SELECT** c1, c2

**FROM** t;

**WITH [CASCADED | LOCAL] CHECK OPTION;**

Create a new view with check option

**CREATE RECURSIVE VIEW** v

**AS**

select-statement -- anchor part

**UNION [ALL]**

select-statement; -- recursive part

Create a recursive view

**CREATE TEMPORARY VIEW** v

**AS**

**SELECT** c1, c2

**FROM** t;

Create a temporary view

**DROP VIEW** view\_name;

Delete a view

## MANAGING INDEXES

**CREATE INDEX** idx\_name

**ON** t(c1,c2);

Create an index on c1 and c2 of the table t

**CREATE UNIQUE INDEX** idx\_name

**ON** t(c3,c4);

Create a unique index on c3, c4 of the table t

**DROP INDEX** idx\_name;

Drop an index

## SQL AGGREGATE FUNCTIONS

**AVG** returns the average of a list

**COUNT** returns the number of elements of a list

**SUM** returns the total of a list

**MAX** returns the maximum value in a list

**MIN** returns the minimum value in a list

## MANAGING TRIGGERS

**CREATE OR MODIFY TRIGGER** trigger\_name

**WHEN EVENT**

**ON** table\_name **TRIGGER\_TYPE**

**EXECUTE stored\_procedure;**

Create or modify a trigger

### WHEN

- **BEFORE** – invoke before the event occurs
- **AFTER** – invoke after the event occurs

### EVENT

- **INSERT** – invoke for INSERT
- **UPDATE** – invoke for UPDATE
- **DELETE** – invoke for DELETE

### TRIGGER\_TYPE

- **FOR EACH ROW**
- **FOR EACH STATEMENT**

**CREATE TRIGGER** before\_insert\_person

**BEFORE INSERT**

**ON** person **FOR EACH ROW**

**EXECUTE stored\_procedure;**

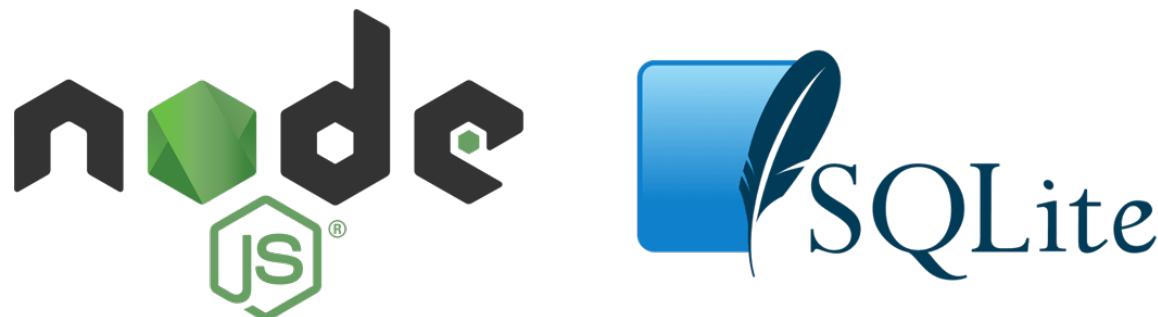
Create a trigger invoked before a new row is inserted into the person table

**DROP TRIGGER** trigger\_name;

Delete a specific trigger

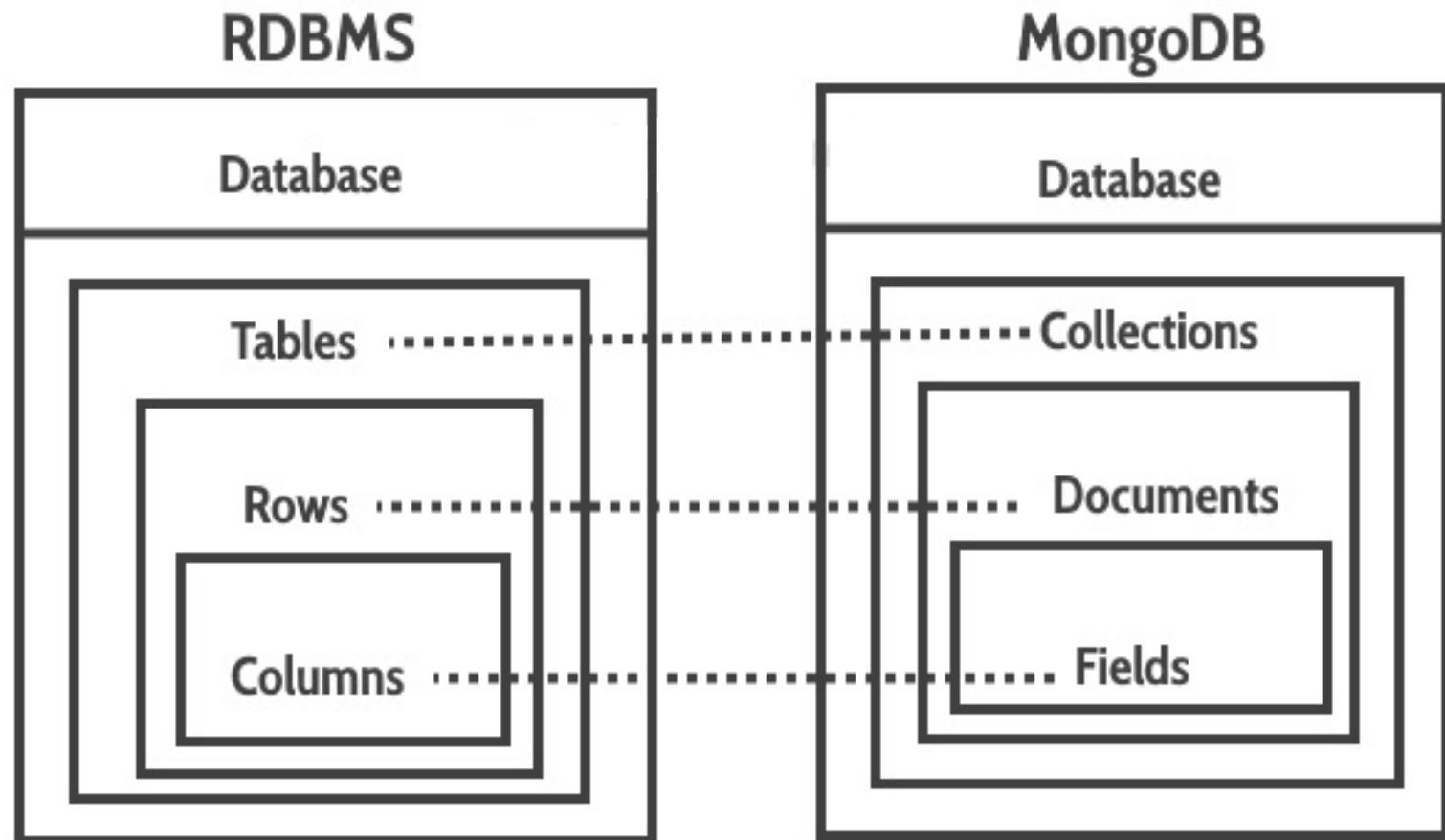
# SQLite

整個資料庫是一個容易備份的檔案



# MongoDB (1/3)

是 Document-based 的 NoSQL 資料庫



# MongoDB (2/3)

Document 裡面是一群 key-value pairs

Relational Database

Student_Id	Student_Name	Age	College
1001	Chaitanya	30	Beginnersbook
1002	Steve	29	Beginnersbook
1003	Negan	28	Beginnersbook



```
MongoDB  
{  
  "_id": ObjectId("....."),  
  "Student_Id": 1001,  
  "Student_Name": "Chaitanya",  
  "Age": 30,  
  "College": "Beginnersbook"  
}  
{  
  "_id": ObjectId("....."),  
  "Student_Id": 1002,  
  "Student_Name": "Steve",  
  "Age": 29,  
  "College": "Beginnersbook"  
}  
{  
  "_id": ObjectId("....."),  
  "Student_Id": 1003,  
  "Student_Name": "Negan",  
  "Age": 28,  
  "College": "Beginnersbook"  
}
```

# MongoDB (3/3)

有類 SQL 的語法和各種好用的資料處理語法

MySQL	MongoDB
<b>INSERT</b>	
<pre>INSERT INTO account (     `A/c number`, `first name`, `last     name` ) VALUES (     '12345746352',     'Mark',     'Jacobs' );</pre>	<pre>db.account.insert({     A/c number: "12345746352",     first name: "Mark",     last name: "Jacobs" });</pre>
<b>UPDATE</b>	
<pre>UPDATE account SET contact number = 9426227364 WHERE A/c number = '12345746352'</pre>	<pre>db.account.update(     { A/c number: '12345746352' },     { \$set: {contact number: 9426227364     } } );</pre>
<b>DELETE</b>	
<pre>DELETE FROM account WHERE e-mail address =     'jv1994@gmail.com';</pre>	<pre>db.account.remove({     "E-mail address": "jv1994@gmail.com" });</pre>

# Mongo Shell

裡面可用部分 Javascript 語法

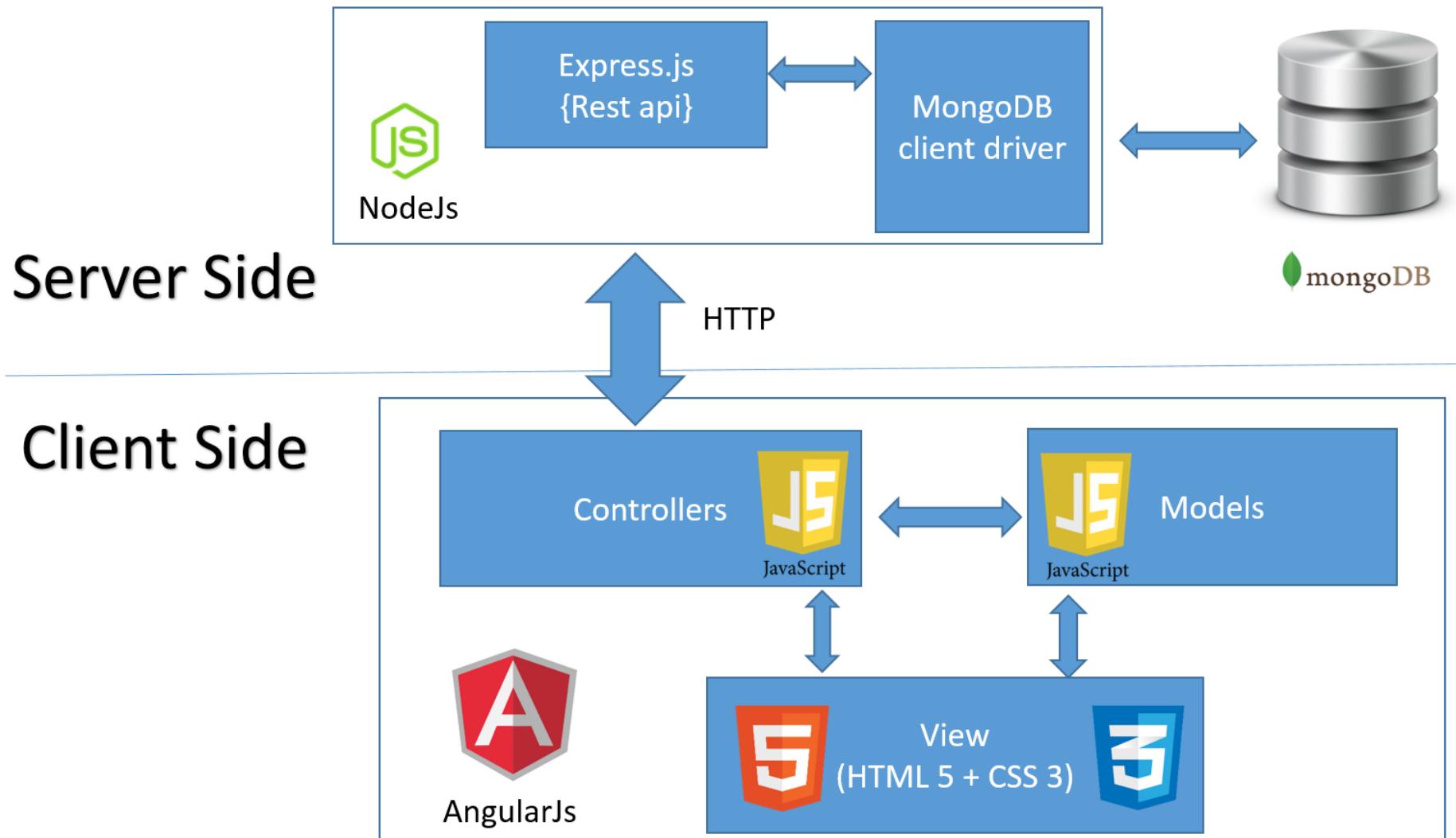
```
C:\WINDOWS\system32\cmd.exe - mongo.exe
C:\VENKAT\DOWNLOADS\MONGO_DB\mongodb-win32-i386-2.0.6\bin>mongo.exe
MongoDB shell version: 2.0.6
connecting to: test
> help
    db.help()                      help on db methods
    db.mycoll.help()                help on collection methods
    rs.help()                       help on replica set methods
    help admin                      administrative help
    help connect                    connecting to a db help
    help keys                       key shortcuts
    help misc                       misc things to know
    help mr                         mapreduce

    show dbs                        show database names
    show collections                show collections in current database
    show users                      show users in current database
    show profile                    show most recent system.profile entries with time >= 1ms
    show logs                       show the accessible logger names
    show_log [name]                 prints out the last segment of log in memory, 'global' is default
    use <db_name>                  set current database
    db.foo.find()                   list objects in collection foo
    db.foo.find( { a : 1 } )        list objects in foo where a == 1
    it                            result of the last line evaluated; use to further iterate
    DBQuery.shellBatchSize = x     set default number of items to display on shell
    exit                           quit the mongo shell

>
> show dbs;
local   <empty>
>
> use mytestdb;
switched to db mytestdb
>
> db.animals.save({name:"Cat"});
> db.animals.save({name:"Dog"});
>
> db.animals.find();
{ "_id" : ObjectId("503bb72c55d654790027eafa"), "name" : "Cat" }
{ "_id" : ObjectId("503bb73f55d654790027eafb"), "name" : "Dog" }
>
> show dbs;
local   <empty>
mytestdb      0.03125GB
> -
```

# Node.js+Mongo (1/2)

兩個哥倆好



# Node.js+Mongo (2/2)

就是寫 Javascript

## Example

Insert a document in the "customers" collection:

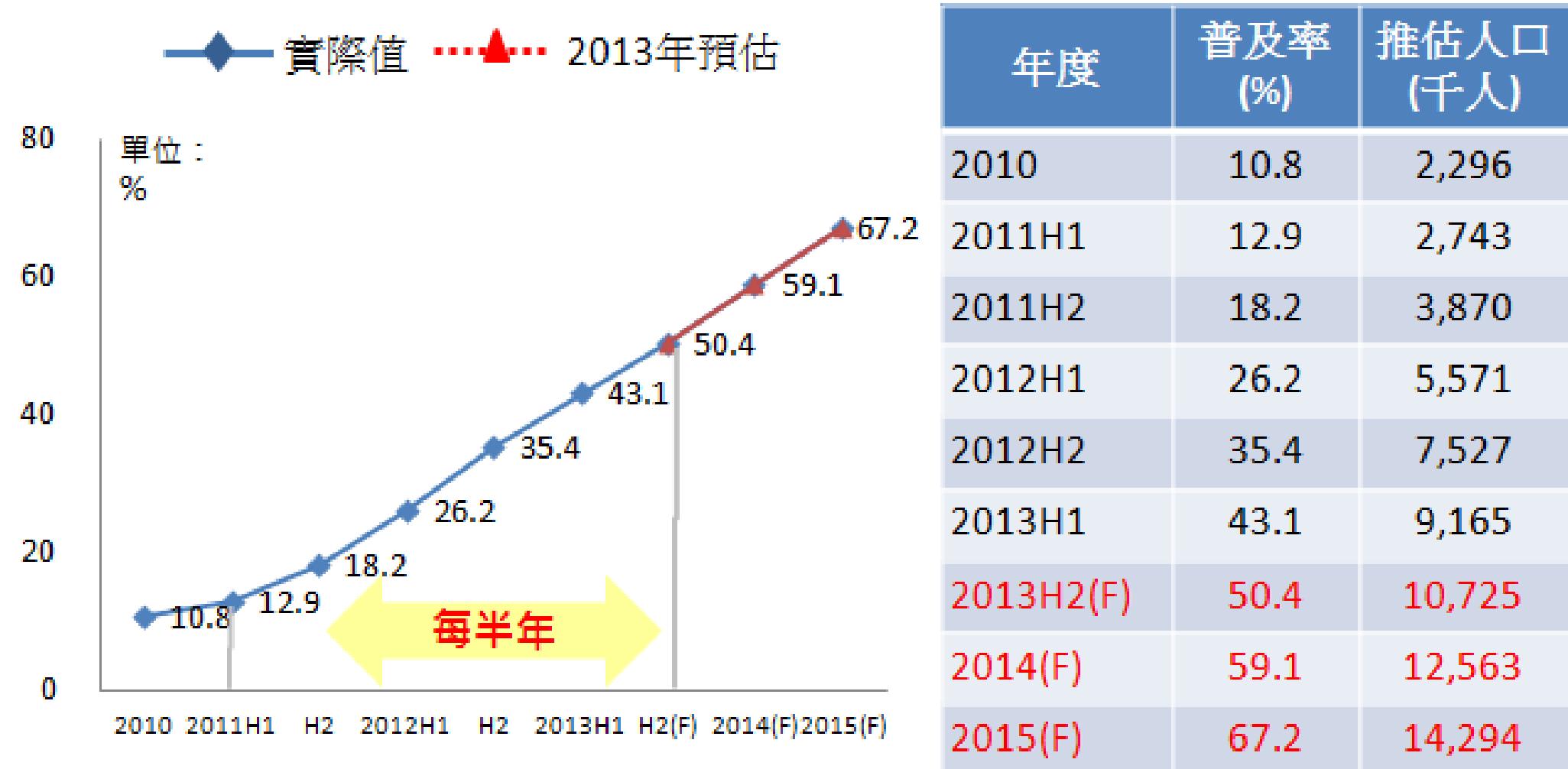
```
var MongoClient = require('mongodb').MongoClient;
var url = "mongodb://localhost:27017/";

MongoClient.connect(url, function(err, db) {
  if (err) throw err;
  var dbo = db.db("mydb");
  var myobj = { name: "Company Inc", address: "Highway 37" };
  dbo.collection("customers").insertOne(myobj, function(err, res) {
    if (err) throw err;
    console.log("1 document inserted");
    db.close();
  });
});
```

[Run example »](#)

# 手機研究與技術

# 台灣智慧型手機市佔率



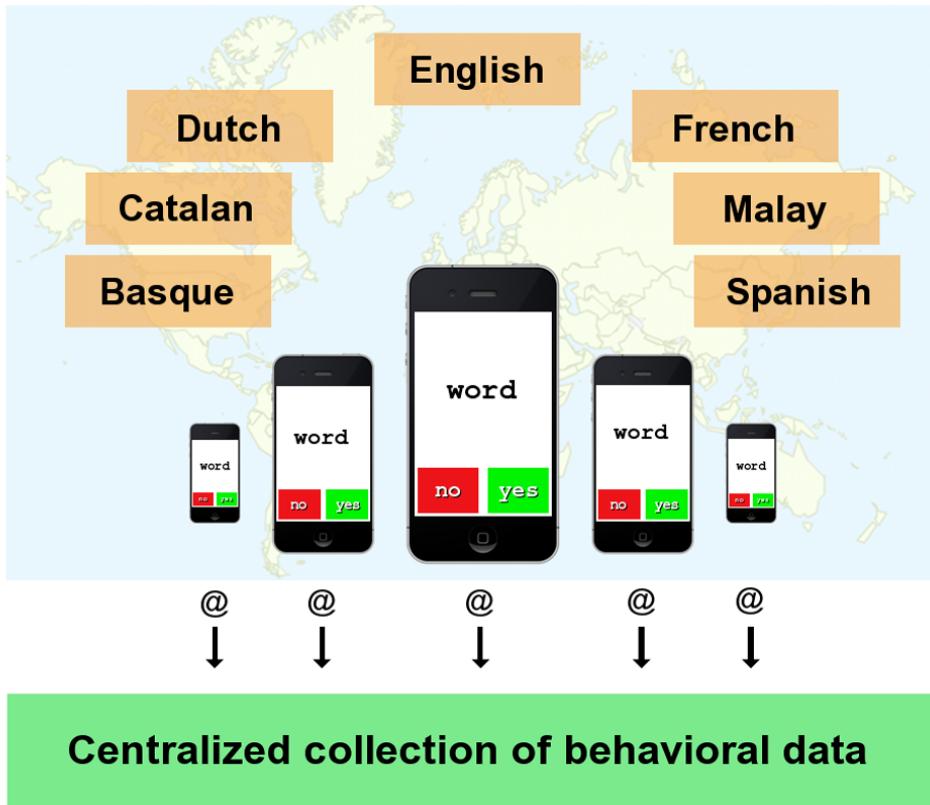
Q: 請問您是否持有智慧型手機？

資料來源：資策會FIND(2013)/經濟部技術處「服務創新體驗設計系統研究與推動計畫」

調查時間：2013年3月21日~5月8日，調查有效樣本：970份

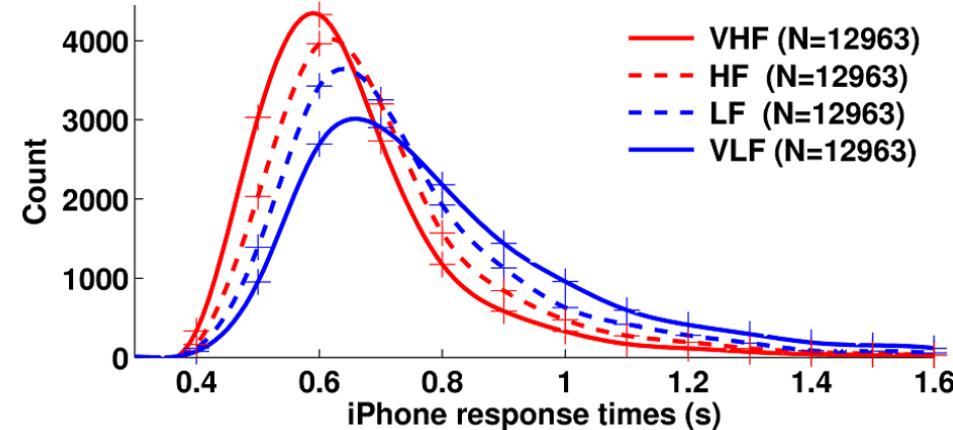
# 手機研究的資料可靠性

A

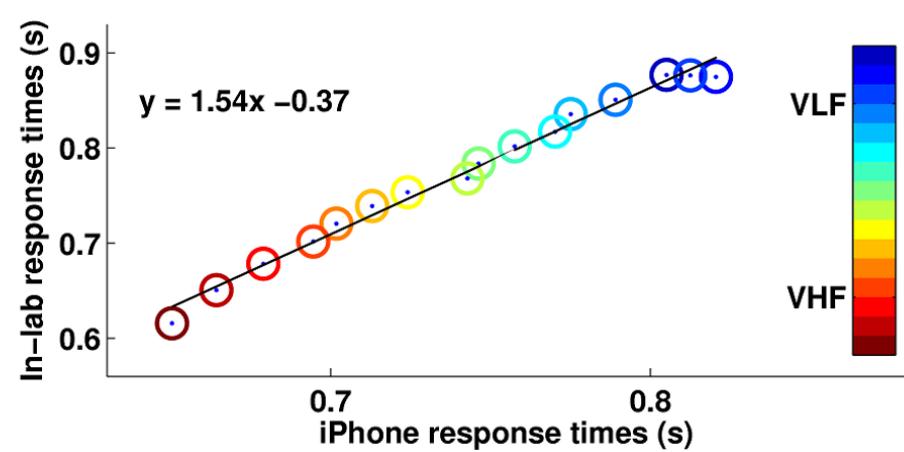


Dufau et al., 2011

B



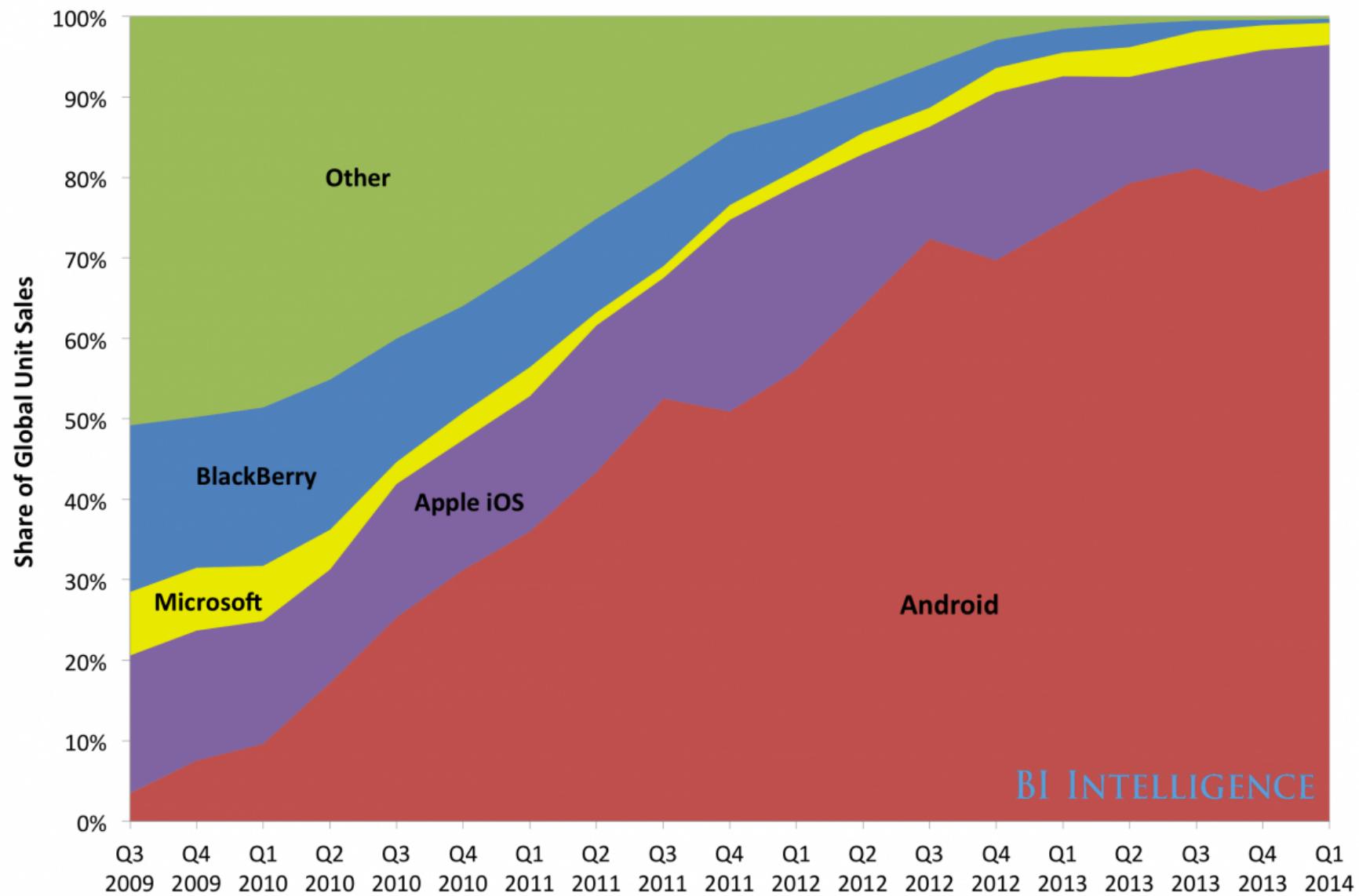
C



這是另一個例子

# 智慧型手機作業系統

## Global Smartphone Market Share By Platform



Source: IDC, Strategy Analytics

BI INTELLIGENCE

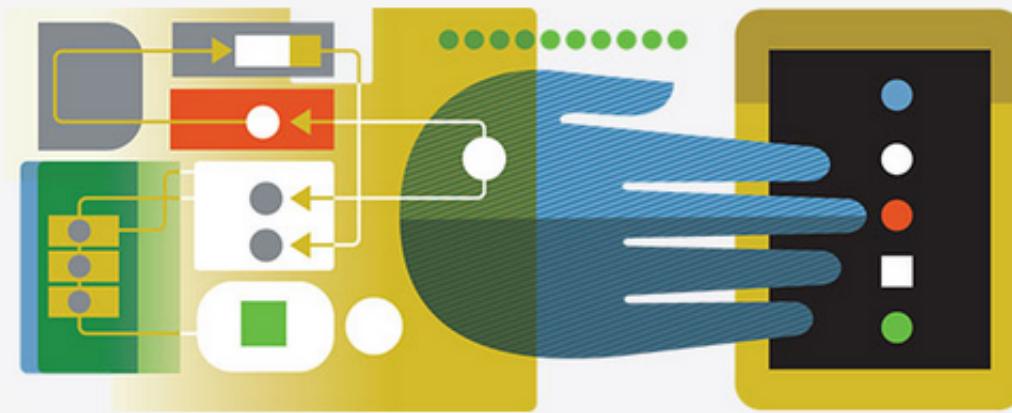
# Responsive Design



# 心理學案例研究：CANTAB

貴貴 der

The leading global provider  
of cognitive assessment  
software



Academic studies

• • • • Cognitive Research

Cognitive Research

Cognitive Tests

Funding Support

Cantab Training

Cantab Ignition resources

# 心理學案例研究：CAN'TAB

Back

Home

## Cognitive Tasks

Task Name

Simple Reaction Time



Choice Reaction Time



Grid



Picture



Sorting



Rotation



Heart



# Experience Sampling Method

在 70 年代左右由 Csikszentmihalyi 與 Larson 所發展

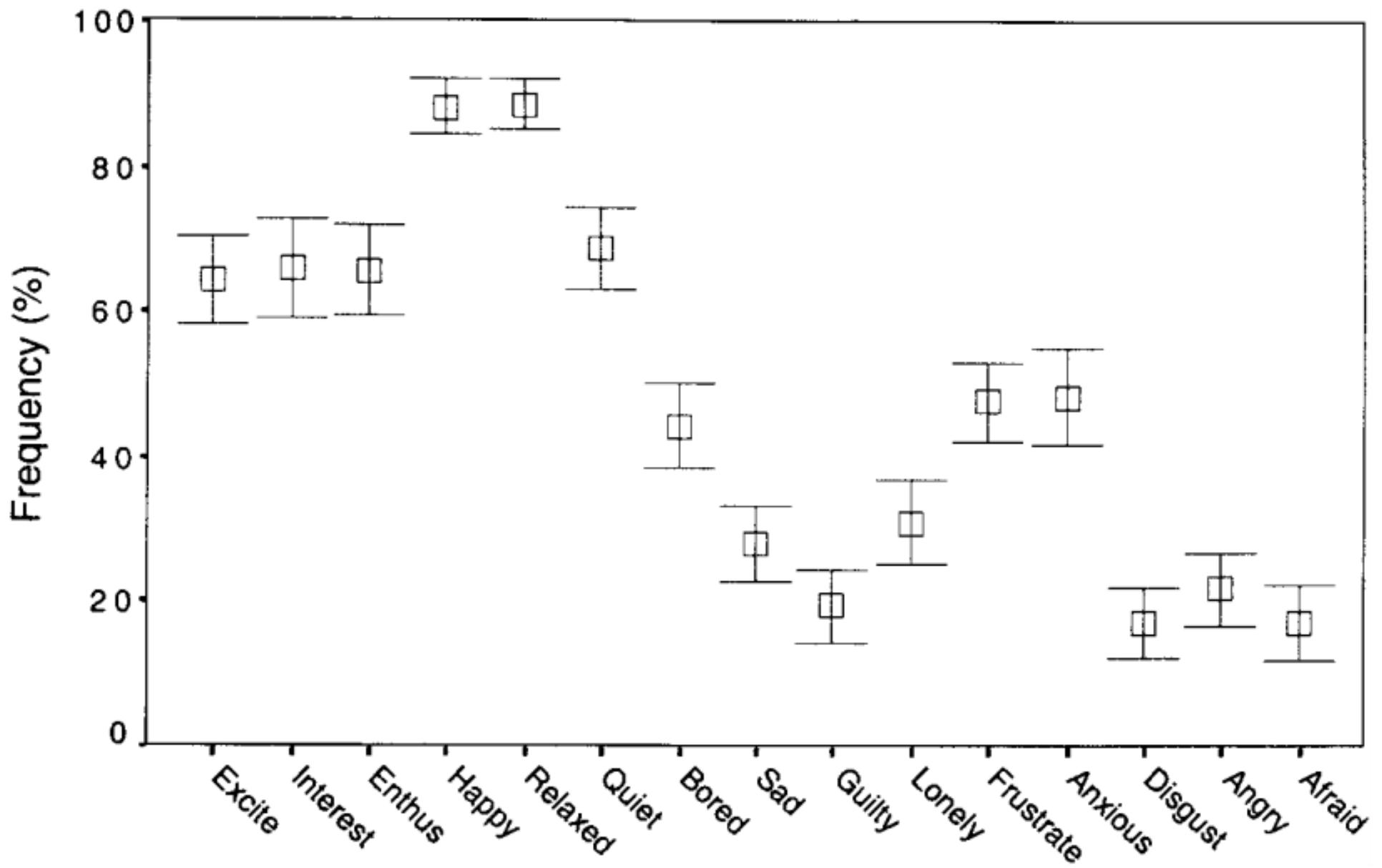
“你現在在幹嘛？”  
“你現在的情緒為何？”

ESM的信度和效度竟然都不錯

- › ~80% 的配合填答率
- › 中到高程度的折半信度
- › 經驗抽樣結果和人格特質相關



# 用 ESM 研究情緒



# 簡單的 ESM 實作

movisensXS

PRICING

SIGN IN

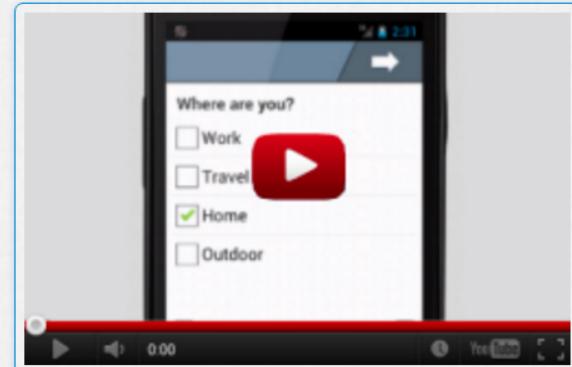
# movisensXS

## eXperience Sampling for Android!

movisensXS is the next generation research tool for ambulatory assessment. Ambulatory assessment refers to the use of computer-assisted methodology for self-reports, behavior records, or physiological measurements, while the participant undergoes normal daily activities. This approach includes the experience sampling method (ESM) a.k.a. ecological momentary assessment (EMA).

Launch your free study today!

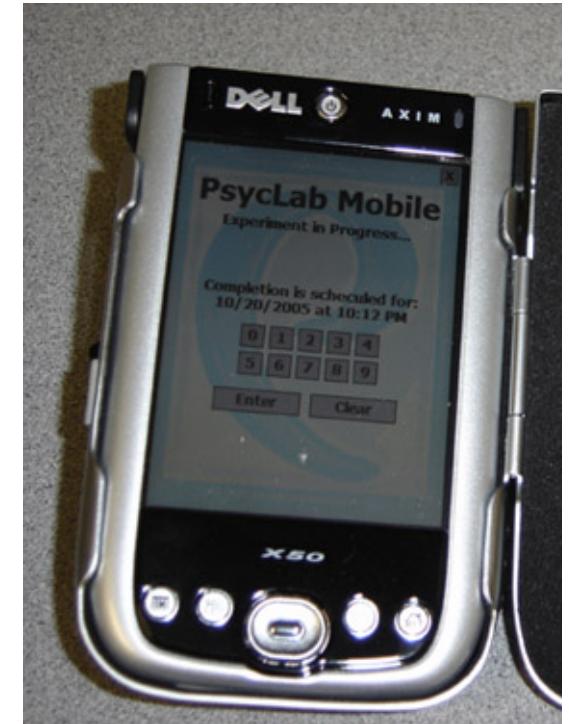
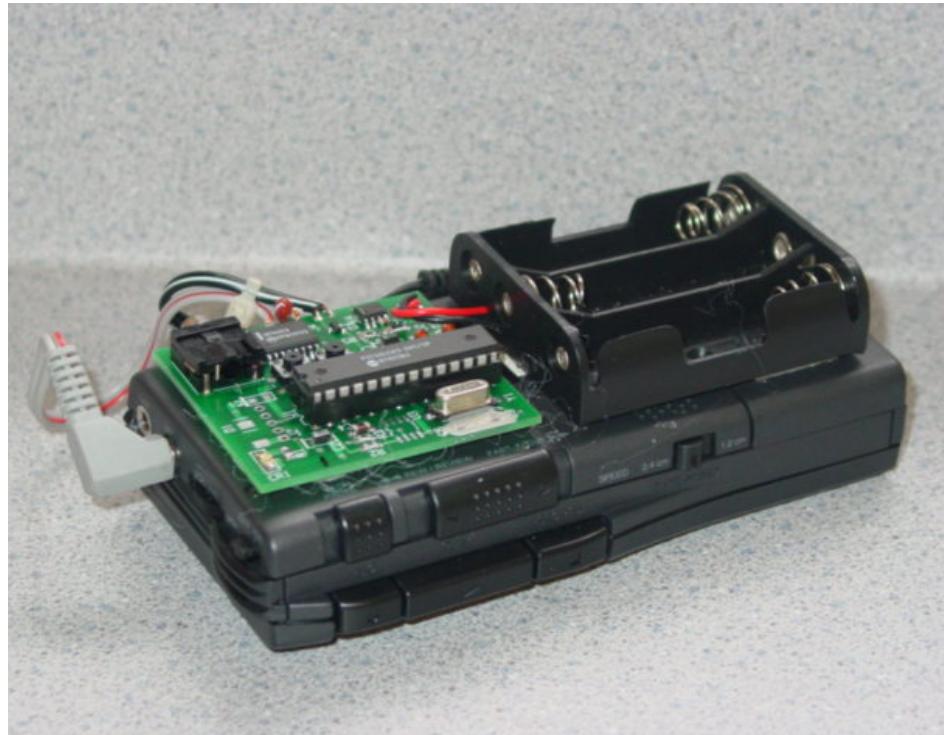
Start now »



Demo: Launch your study in 2 minutes!

# Electronically Activated Recorder

EAR 由 Matthias Mehl 發展



幾天內，每隔 12 分"主動"錄音 30 秒

# 用EAR來研究大學生都在幹嘛

*Mapping Students' Social Environment: Judges' Reliabilities and  
Base Rates for the Electronically Activated Recorder Ratings  
of Participants' Daily Interactions, Activities, and Locations  
Across 4 Days of Monitoring*

Category	Judges' reliability	Base rate (%)			
		M	SD	Min	Max
<b>Interaction</b>					
Alone	.93	68.6	15.0	37.0	97.6
Talking	.99	27.9	12.8	1.7	56.1
To others	.99	24.2	12.3	1.7	55.4
On the phone	1.00	3.8	3.2	0.0	13.3
Laughing	.86	5.9	3.9	0.0	15.8
<b>Activity</b>					
Music on	.89	13.5	9.7	0.0	41.4
TV on	.95	14.6	12.2	1.1	47.5
Computer	.96	8.5	7.4	0.0	38.5
Reading	.12	11.3	10.2	0.0	34.0
Working	.95	5.1	9.7	0.0	37.0
Eating	.64	2.6	2.2	0.0	11.8
Lecture	.98	11.3	6.5	0.0	29.0
Amusement	.71	14.1	18.0	0.0	71.4
<b>Location</b>					
Apartment	.97	56.2	17.9	11.4	86.5
Outdoors	.90	7.2	5.2	1.0	32.9
In transit	.85	4.1	4.2	0.0	16.0
Restaurant	1.00	2.1	3.7	0.0	24.7
Other public places	.86	27.7	14.4	5.3	70.0

*Note.* N = 49; reliability coefficients are Cronbach's alphas based on six transcribers scoring 88 intervals. Min = minimum; Max = maximum.

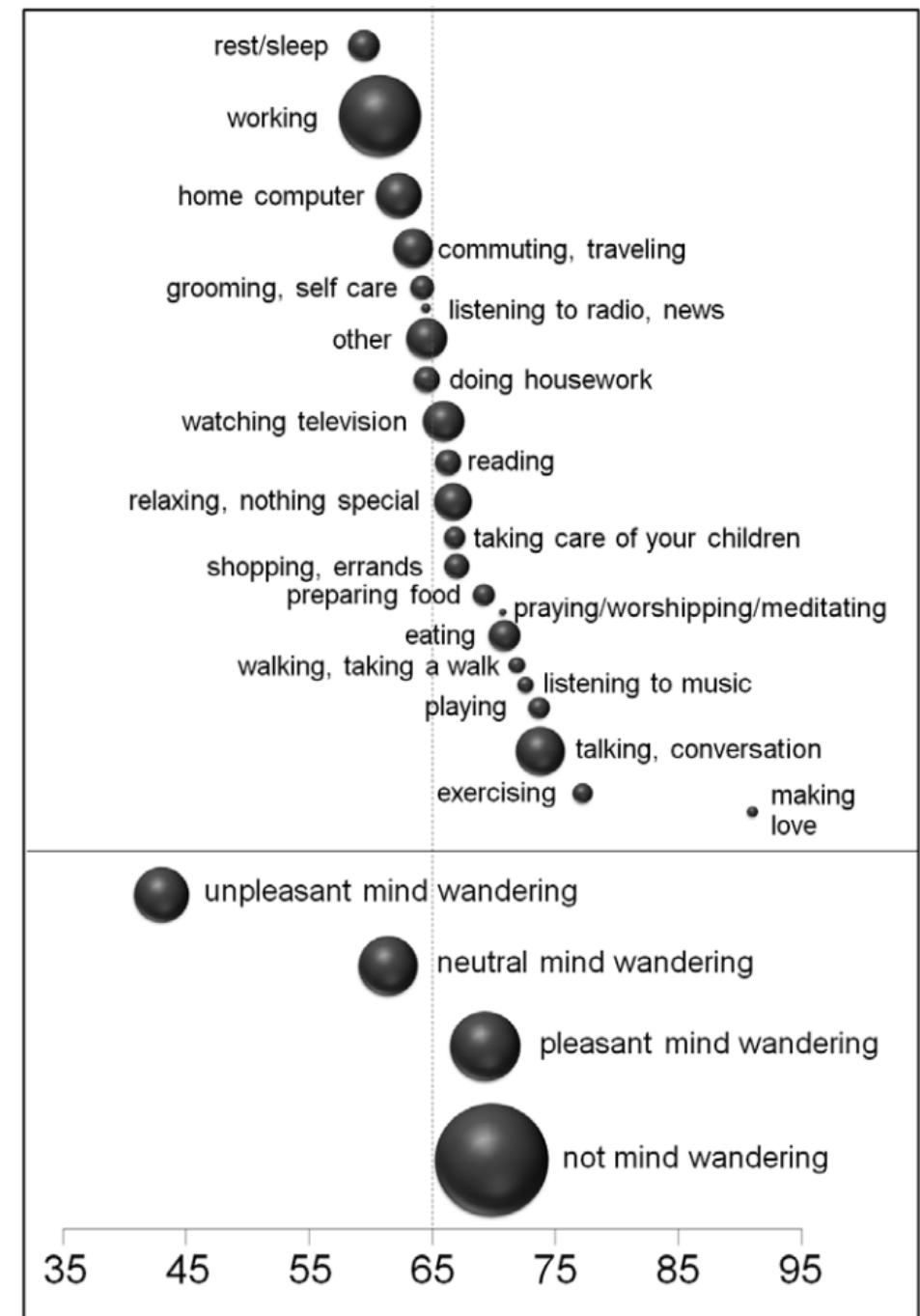
# 心理學案例研究：男女誰多話？



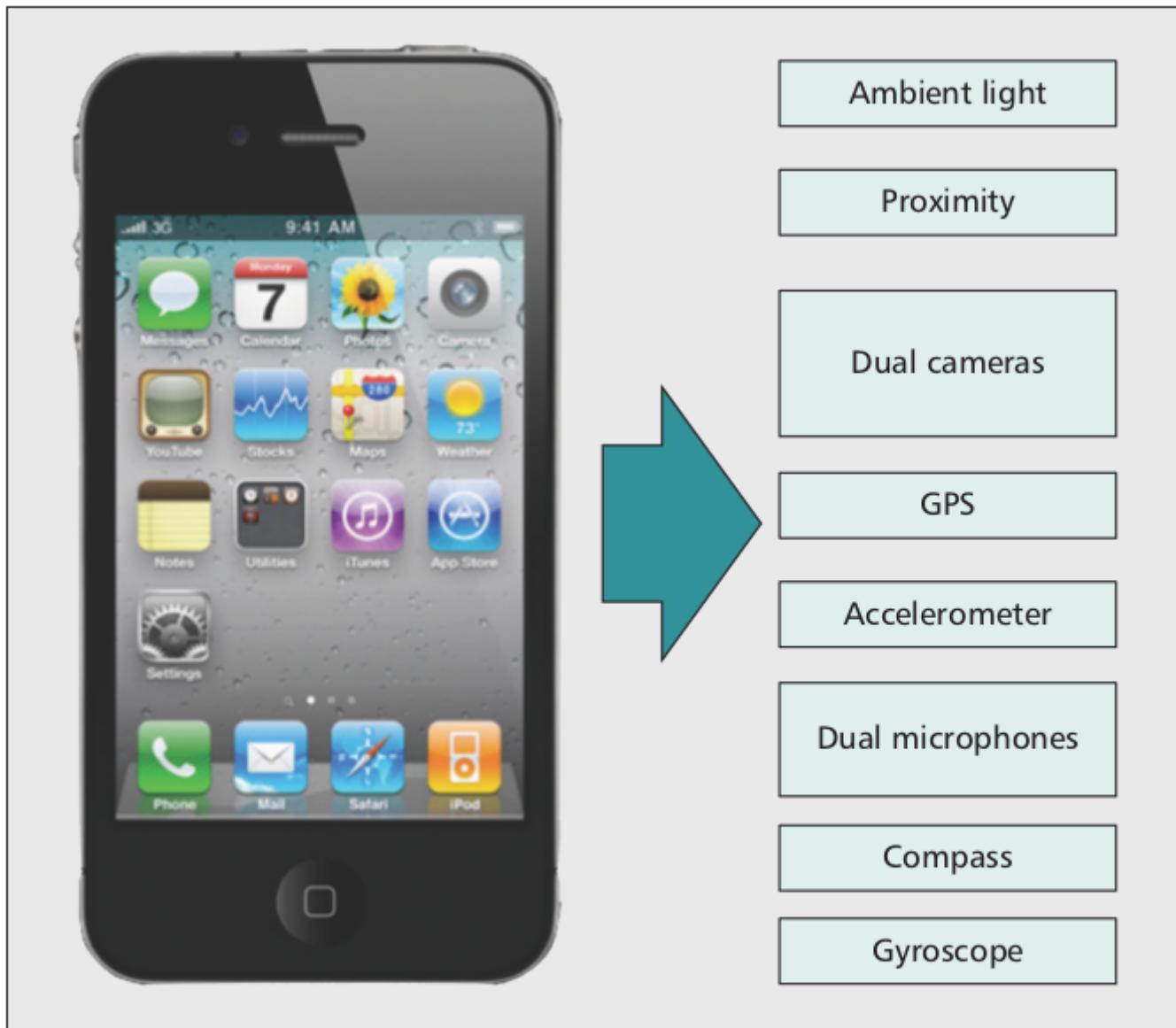
Sample	Year	Location	Duration	Age range (years)	Sample size (N)		Estimated average number (SD) of words spoken per day	
					Women	Men	Women	Men
1	2004	USA	7 days	18–29	56	56	18,443 (7460)	16,576 (7871)
2	2003	USA	4 days	17–23	42	37	14,297 (6441)	14,060 (9065)
3	2003	Mexico	4 days	17–25	31	20	14,704 (6215)	15,022 (7864)
4	2001	USA	2 days	17–22	47	49	16,177 (7520)	16,569 (9108)
5	2001	USA	10 days	18–26	7	4	15,761 (8985)	24,051 (10,211)
6	1998	USA	4 days	17–23	27	20	16,496 (7914)	12,867 (8343)
Weighted average					16,215 (7301)	15,669 (8633)		

Mehl et al., 2007, *Science*

# 心理學案例研究：何時較開心？



# 智慧型手機革命



**Figure 1.** An off-the-shelf iPhone 4, representative of the growing class of sensor-enabled phones. This phone includes eight different sensors: accelerometer, GPS, ambient light, dual microphones, proximity sensor, dual cameras, compass, and gyroscope.

# 手機程式的分類

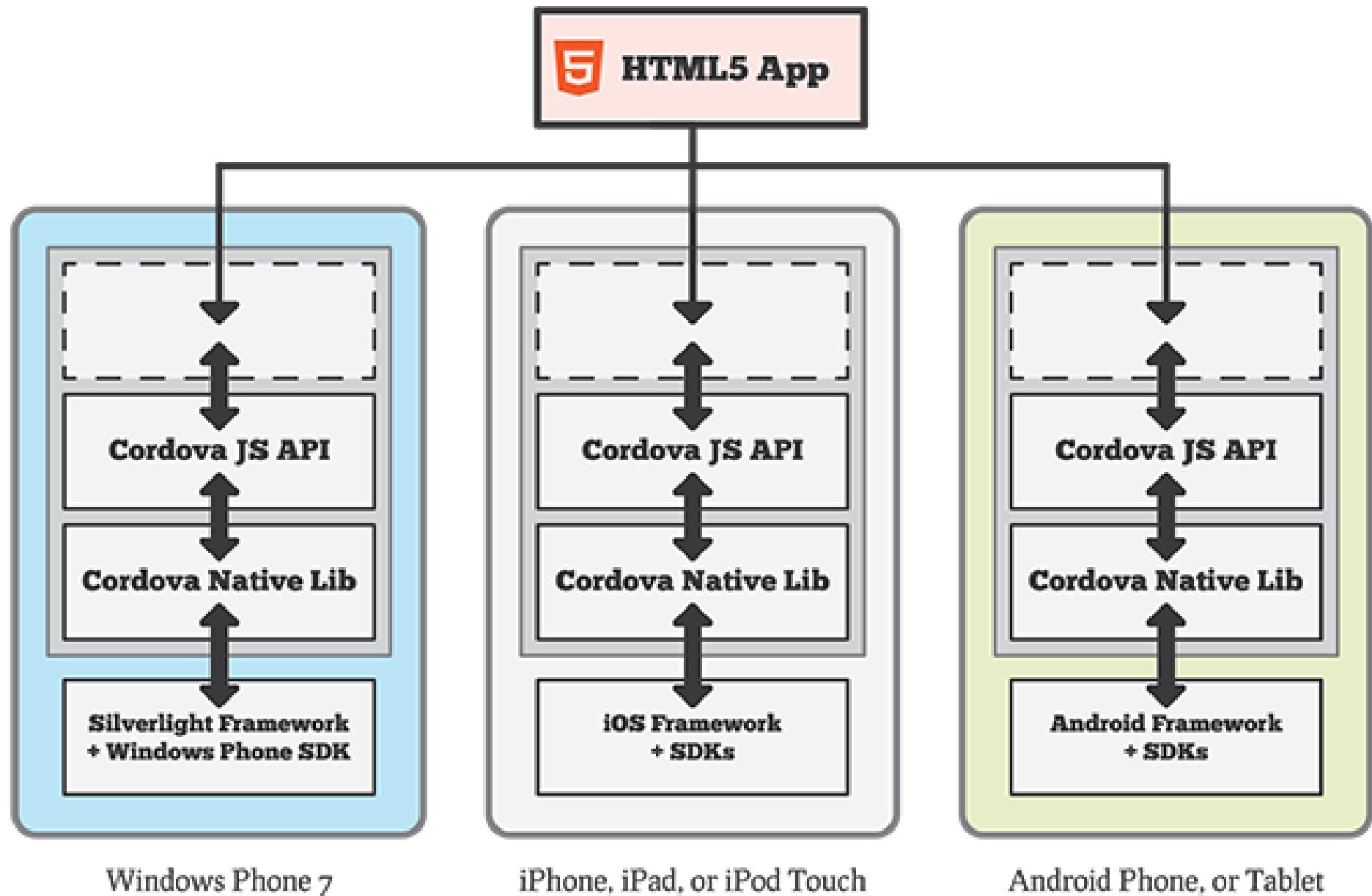


**Native App:** Android SDK (JAVA) + Xcode (Objective C)

**Web App:** HTML5 + CSS3 + Javascript/jQuery

**Hybrid App:** Web App + PhoneGap/Cordova (Javascript)

# PhoneGap/Cordova Framework



# PhoneGap/Cordova APIs

	iOS iPhone / iPhone 3G	iOS iPhone 3GS and newer	Android	BB OS 4.6-4.7	BB OS 5.x	BB OS 6.0+	hp WebOS	WP7	Symbian	bada
ACCELEROMETER	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
CAMERA	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
COMPASS	✗	✓	✓	✗	✗	✗	✗	✓	✗	✓
CONTACTS	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓
FILE	✓	✓	✓	✗	✓	✓	✗	✓	✗	✗
GEOLOCATION	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MEDIA	✓	✓	✓	✗	✗	✗	✗	✓	✗	✗
NETWORK	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NOTIFICATION (ALERT)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NOTIFICATION (SOUND)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NOTIFICATION (VIBRATION)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
STORAGE	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗

# PhoneGap/Cordova Example 1

APIs      Contacts

**create**  
Create a contact

**find**  
Find contacts

**create()**  
Returns a new Contact object.

```
var contact = navigator.contacts.create(  
  {  
    name: { givenName: "john",  
            lastName: "smith"},  
    phoneNumbers: [  
      new ContactField("Type", "Phone Number"),  
      new ContactField("Type", "Phone Number")],  
    emails: [  
      new ContactField("Type", "Email Address"),  
      new ContactField("Type", "Email Address")]  
  });  
contact.save();
```

Invoke Now



PhoneGap

# PhoneGap/Cordova Example 2

APIs      Camera

**getPicture**  
Get a picture from the camera app

**cleanup**  
Cleanup temporary files

**camera.getPicture()**  
Provides access to the device's default camera application.

```
navigator.camera.getPicture(successHandler, errorHandler,
  { quality: 25,
    sourceType: Camera.PictureSourceType.CAMERA,
    destinationType: Camera.DestinationType.DATA_URL,
    encodingType: Camera.EncodingType.JPEG
});
```

Invoke Now



PhoneGap

# 本週作業

學習前後端傳輸資料

1. 修改 `07_Codes` 中的 `colors` 程式，使其 `submit` 後能將作答結果送到自己開發，能秀出平均正確率與反應時間給受試者的 `scores.php` 。

-----這是隨你 / 婦要不要做的分隔線 -----

2. 把 Facebook Login加入到 `colors` 的程式中，使受試者分數能以具名的方式儲存在後端。

# Game Over

