

I Won't Say “Manual Testing”

(a better way to speak and think for serious testers)

James Bach

james@satisfice.com

Michael Bolton

michael@developsense.com

The dictionary doesn't help much.

manual /'manjʊ(ə)l /

adjective

relating to or done with the hands: manual dexterity.

(of a device) **operated or controlled by hand, rather than automatically or electronically**: a manual typewriter.

[attributive] **using or working with the hands**: a manual labourer.

noun

1 a book giving instructions or information:

a computer manual.

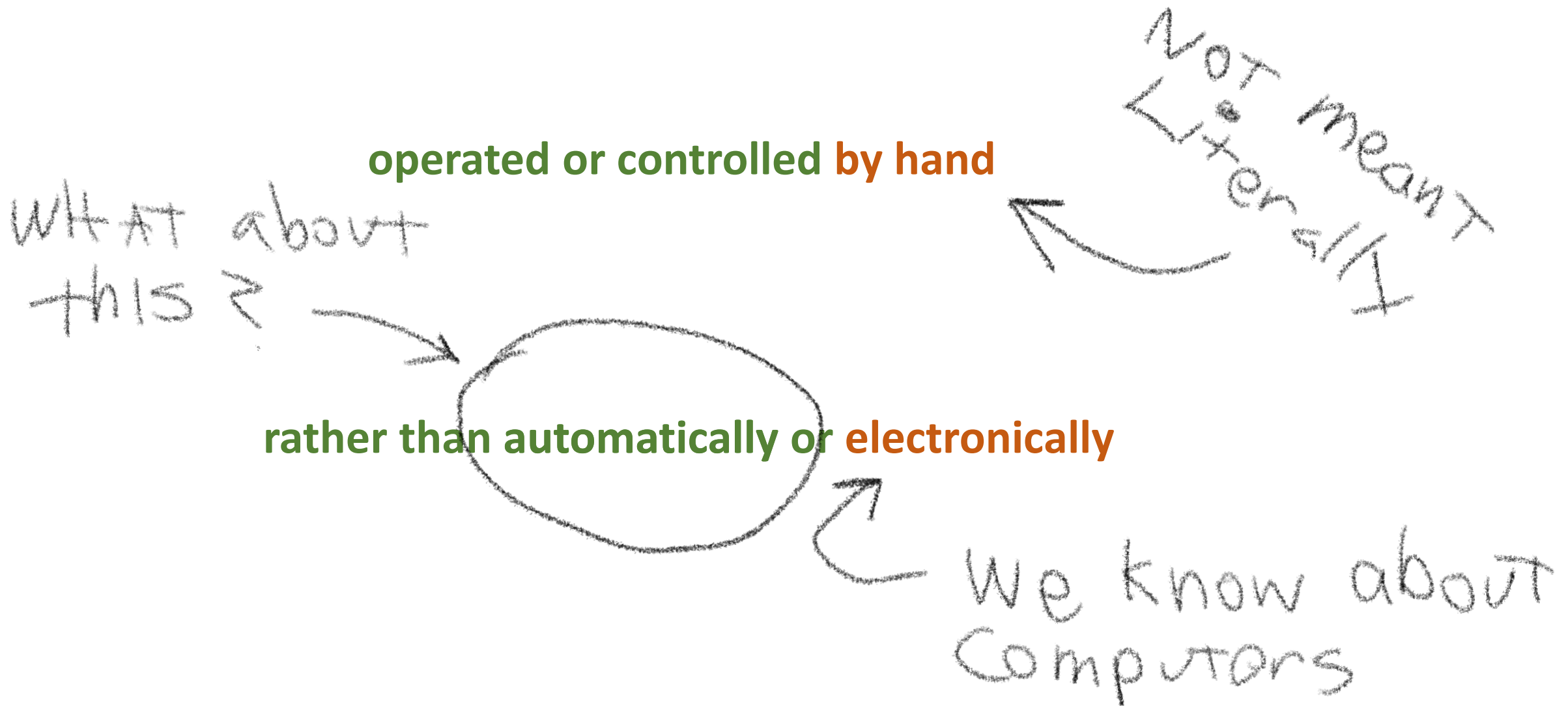
(in the Christian Church) a book of the forms to be used by priests in the administration of the sacraments.

2 a vehicle with manual transmission.

3 **an organ keyboard played with the hands not the feet.**

– ORIGIN late Middle English : from Old French manuel, from Latin manualis, from manus 'hand'.

The Oxford English Dictionary relies on idiom and a general reference to our area of expertise.



This definition is more helpful...

automatically /ˌɔːtə'matɪkli/

adverb

1 (with reference to a device or process) by itself **with little or no direct human control**

- the kettle automatically switched off when it boiled.

(with reference to a firearm) continuously until the pressure on the trigger is released

- the recovered weapons had been illegally modified to fire fully automatically.

2 **without conscious thought or attention**; spontaneously:

- although I used my best Italian, the receptionists automatically replied in English.

as a necessary and inevitable result of a fixed rule or particular set of circumstances

- his passport was automatically revoked

- the winners of the Division 2 final are not automatically promoted.

So, this is the **opposite** of manual...

without conscious thought or attention

with little or no direct human control

as a necessary and inevitable result

And, this is **manual**...

with

~~without~~ conscious thought or attention

Personal Experience; Insight; Growth

with

~~with little or no~~ direct human control

Responsibility; Choices

Creative

as a ~~necessary and inevitable~~ result

Experiments; Discoveries

When you want to say “Manual Testing” consider these more specific alternatives

Aspects

- **Attended** (my presence is needed)
- **Experiential** (I interact realistically)
- **Exploratory** (I make choices as I go)

Opposite

- **Unattended** (I could be asleep)
- **Instrumented** (my experience is distorted)
- **Scripted** (choices are made for me)

When you want to say “Manual Testing” consider these more specific alternatives

Aspects

- **Attended** (my presence is needed)
- **Experiential** (I interact realistically)
- **Exploratory** (I make choices as I go)

Opposite

- **Unattended** (I could be asleep)
- **Instrumented** (my experience is distorted)
- **Scripted** (choices are made for me)

“I performed attended tests.”

This means that I personally witnessed or performed important actions that characterized the testing.

When you want to say “Manual Testing” consider these more specific alternatives

Aspects

- **Attended** (my presence is needed)
- **Experiential** (I interact realistically)
- **Exploratory** (I make choices as I go)

Opposite

- **Unattended** (I could be asleep)
- **Instrumented** (my experience is distorted)
- **Scripted** (choices are made for me)

“I performed experiential testing.”

This means that my encounter with the product was practically the same as that of a particular kind of user I had in mind.

When you want to say “Manual Testing” consider these more specific alternatives

Aspects

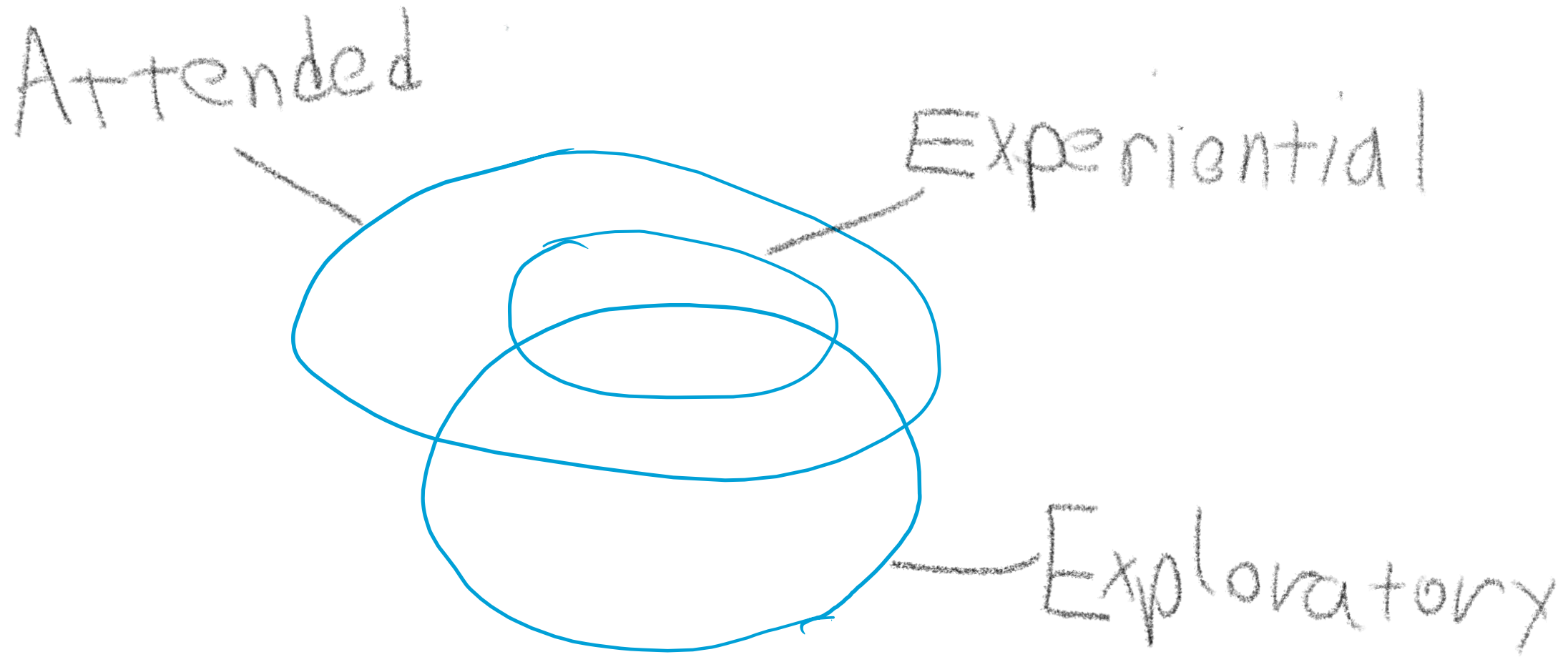
- **Attended** (my presence is needed)
- **Experiential** (I interact realistically)
- **Exploratory** (I make choices as I go)

Opposite

- **Unattended** (I could be asleep)
- **Instrumented** (my experience is distorted)
- **Scripted** (choices are made for me)

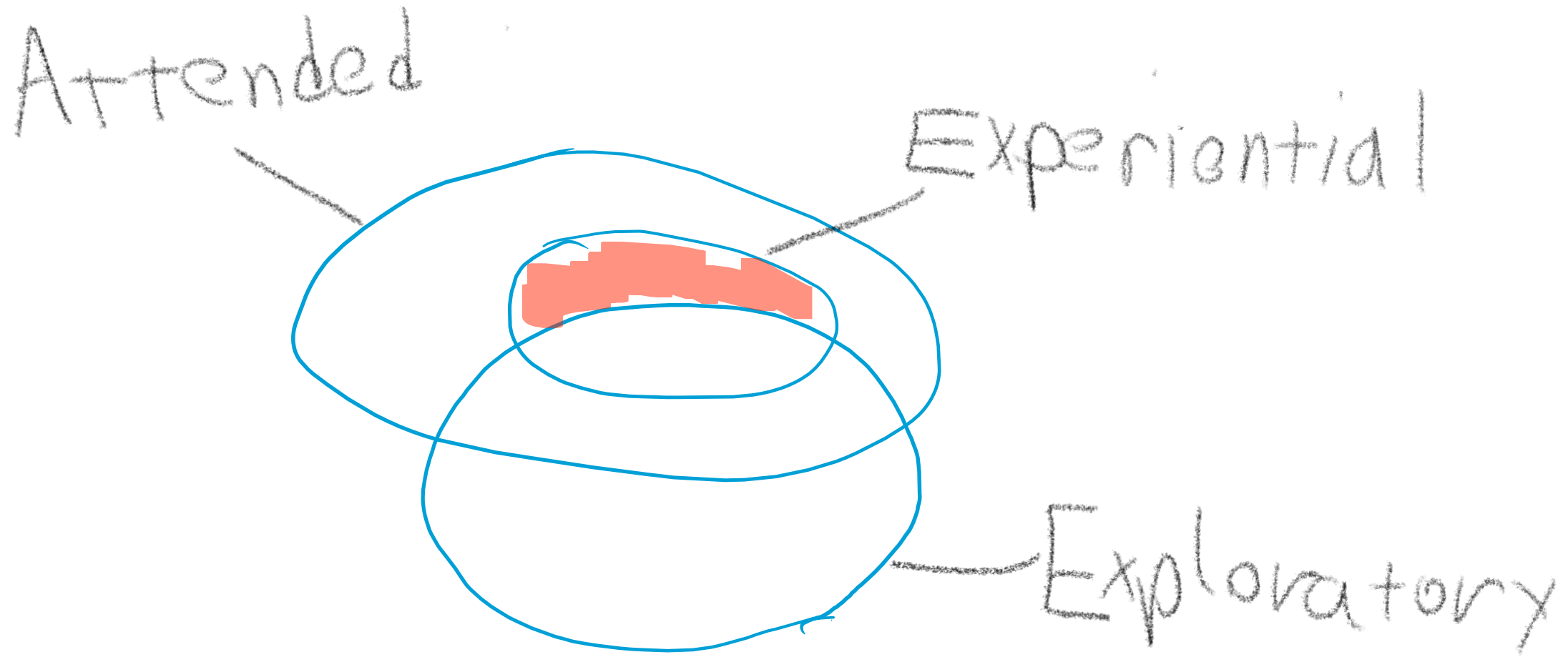
“My testing was mostly exploratory.”

This means that I did not enter the test activity with a detailed or immutable test procedure in mind; nor was anyone dictating to me what I had to do.



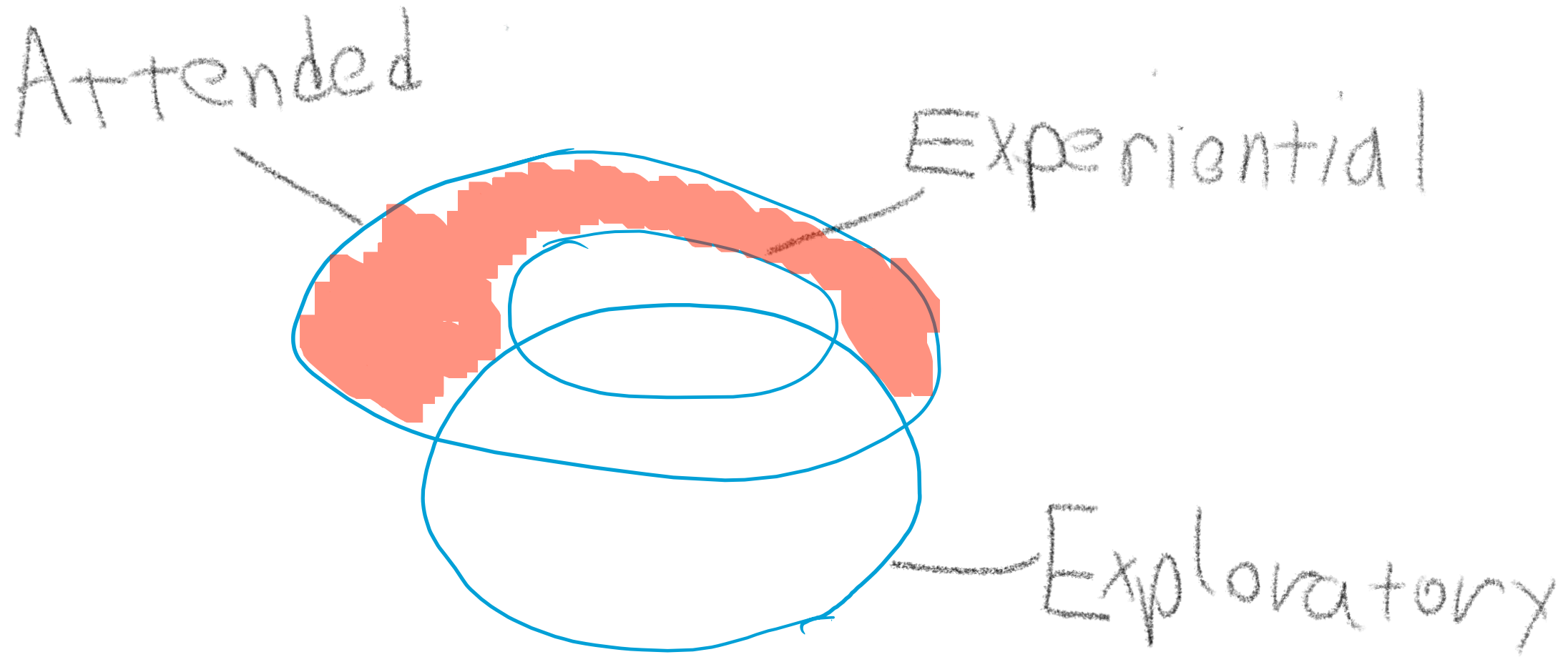
These are not synonyms, but they do overlap. They combine into five configurations.

Each configuration is a kind of “manual testing.”



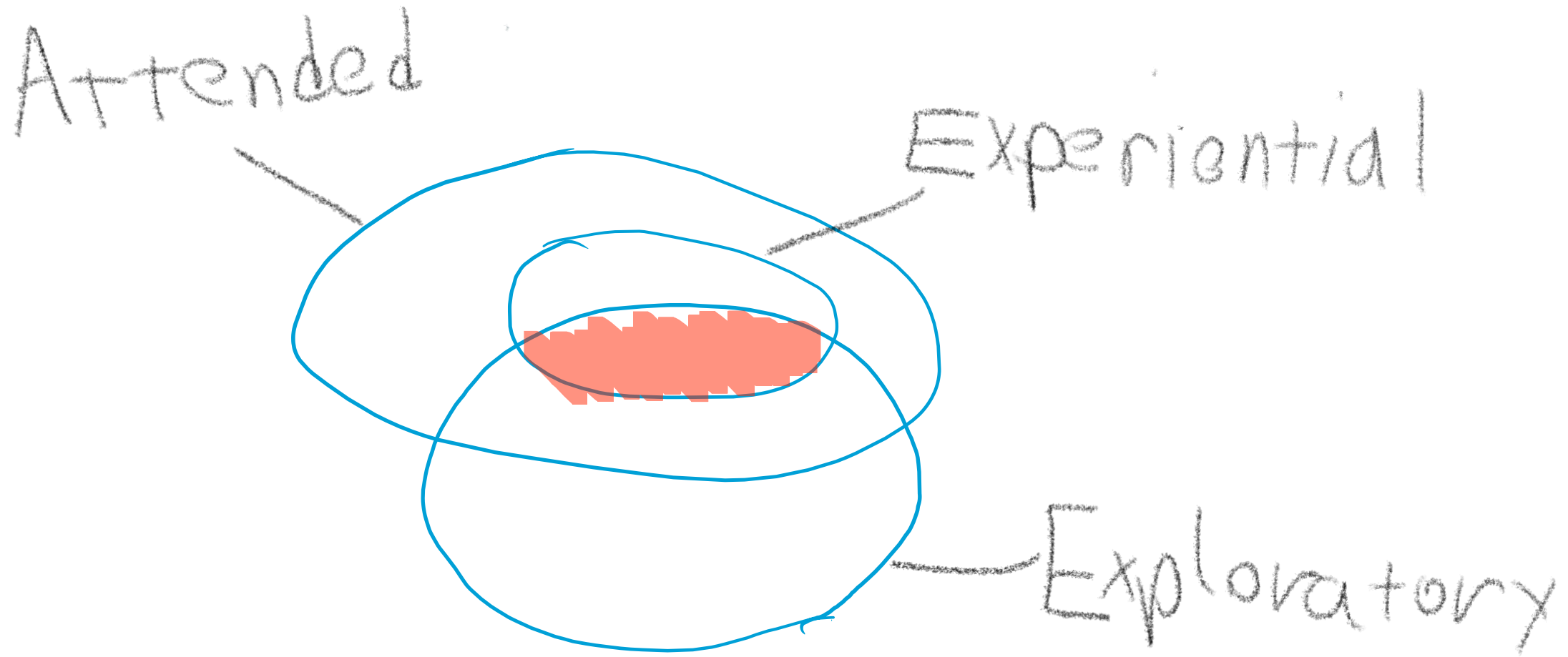
Attended and experiential, but not very exploratory

Following a detailed script that reflects how a user might interact with the product.



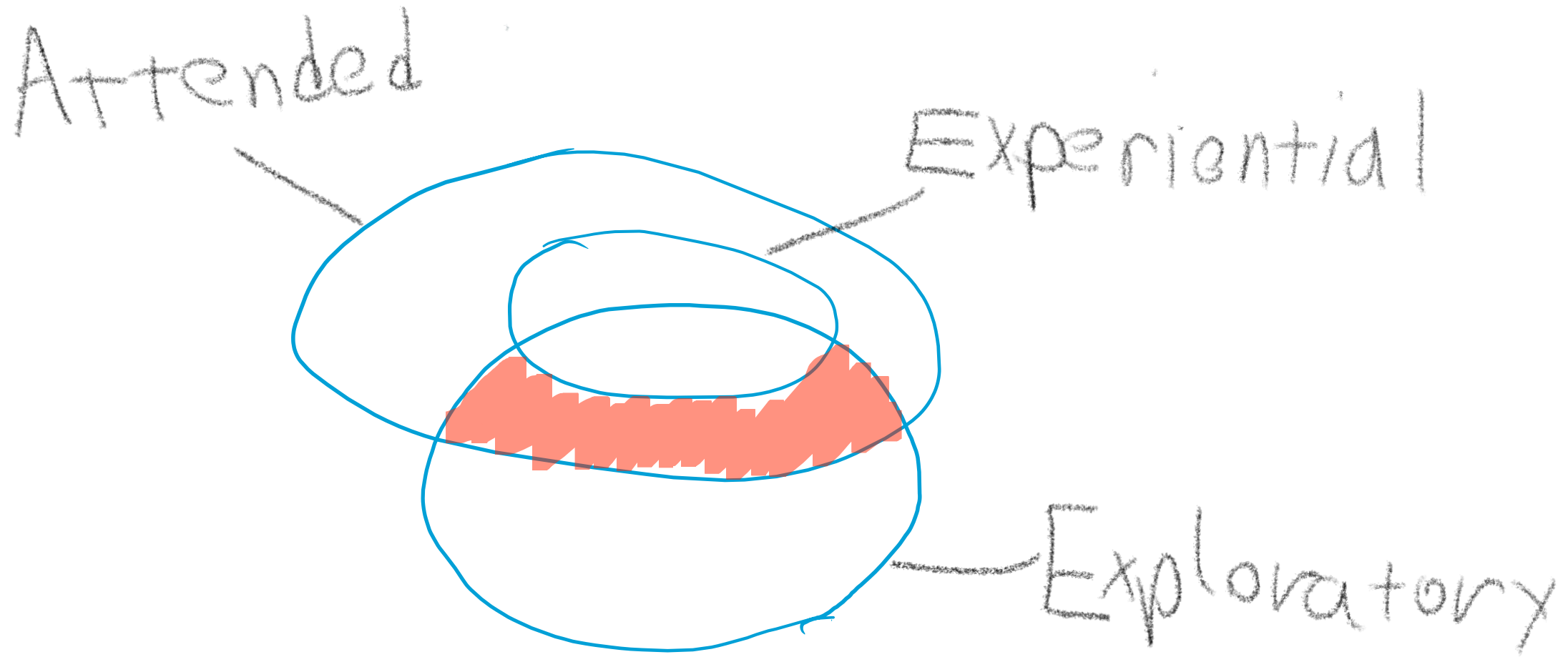
Attended, but neither experiential nor very exploratory

Watching an automated script to see what it does and intervene if it gets stuck.



Attended, experiential, and highly exploratory

Interacting with the product in a natural way, using it for its intended purposes. Asking questions and investigating mysteries.

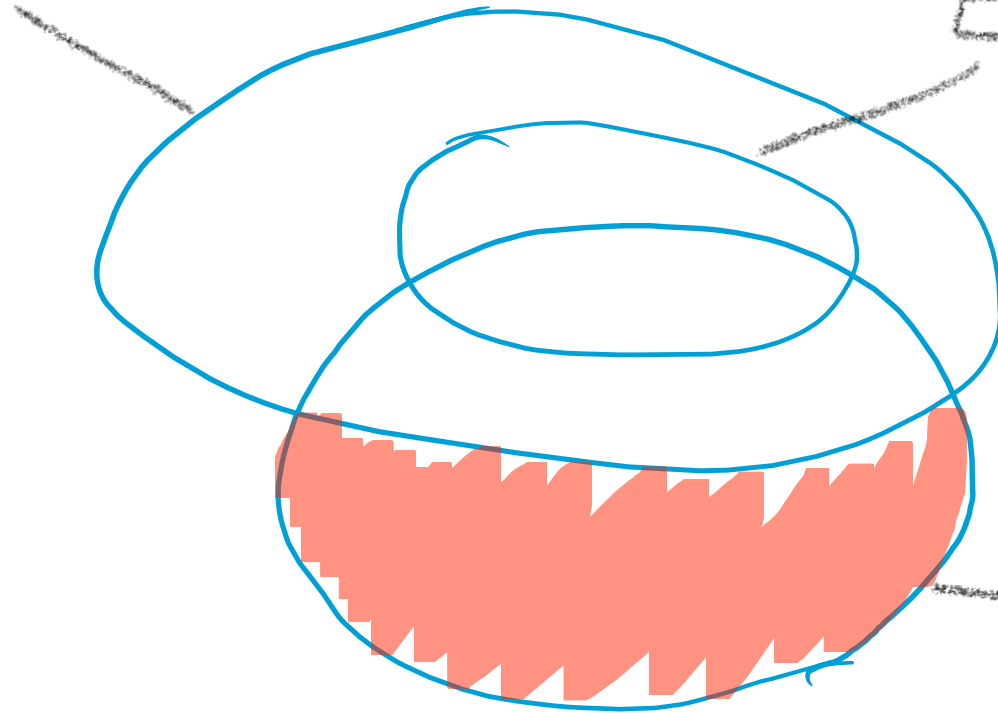


Attended and exploratory, but not very experiential

Using an API or automation tool in real time to try things with the product, see what happens, and get new test ideas.

Attended

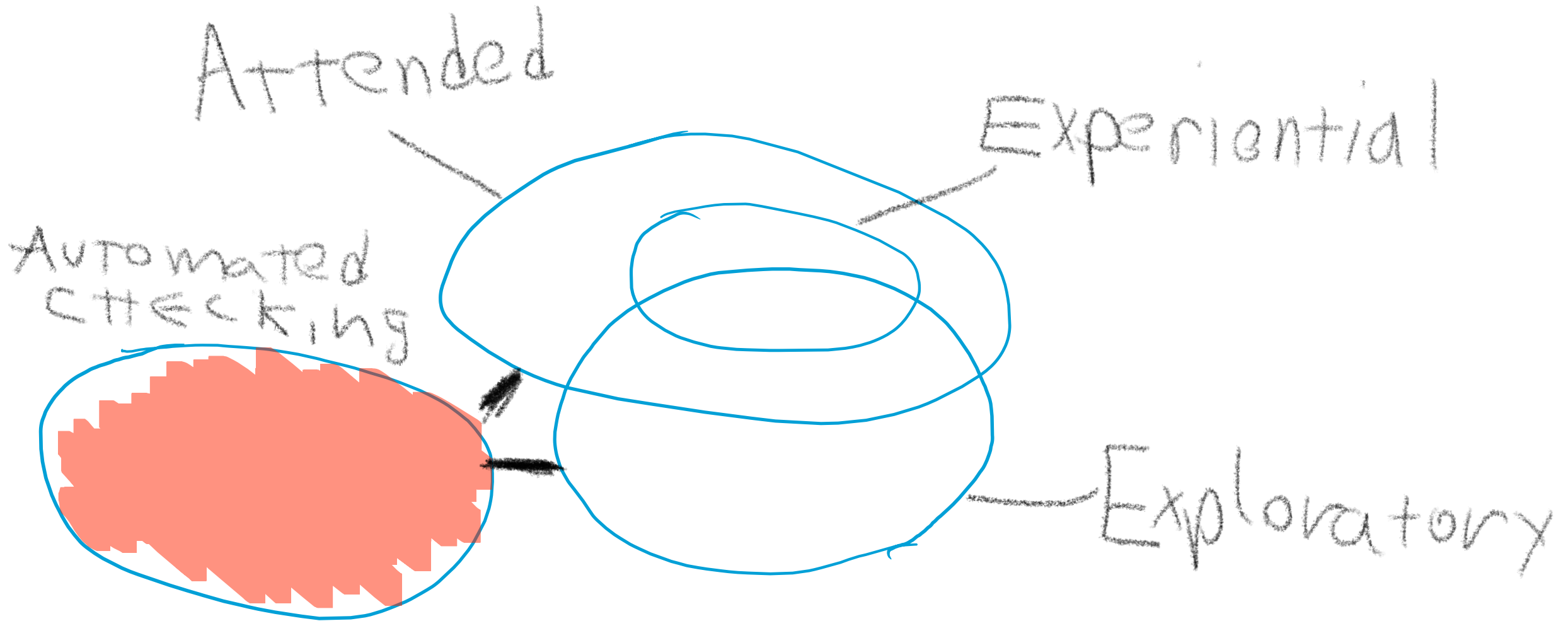
Experiential



Exploratory

Highly exploratory, but neither attended nor experiential

Giving another tester instructions and later hearing results. Then, reacting to those results and providing updated guidance.



Not Manual At All: neither attended, nor experiential, nor exploratory
Automated output checking is not, by itself, testing, but it is often a major component of testing.

Testing is inherently human (but tools can help).

All testing is, *to some degree...*

Transformative,
as opposed to merely **transactional**

Interpretive,
as opposed to merely **literal**

Speculative,
as opposed to merely **demonstrative**

Tacit,
as opposed to merely **explicit**

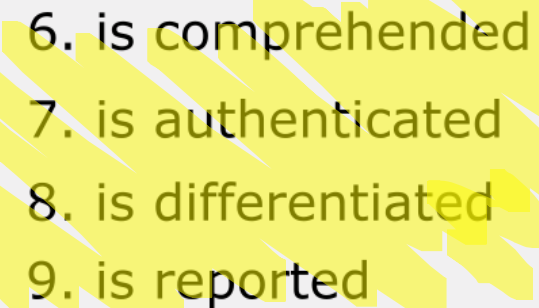
Bug Reporting Pipeline

The bug...

Social
Competence



1. exists
2. is producible
3. is produced
4. is observable
5. is observed

- 
6. is comprehended
 7. is authenticated
 8. is differentiated
 9. is reported

10. is received
11. matters

Example: Testing a random date generator

```
1 ---
2 title: "Random Date Testing"
3 output:
4   html_document:
5     theme: readable
6   html_notebook: default
7   word_document: default
8   pdf_document: default
9 ---
10 [sh, echo=FALSE, results='hide', eval=TRUE]
11 pytest_get_random_data.py
12
```

```
===== test session starts =====
platform win32 -- python 3.8.2, pytest-6.2.1, py-1.10.0, pluggy-0.13.1
rootdir: c:\code\testing\randomdates
plugins: allure-pytest-2.8.31, cov-2.10.1, forked-1.3.0, html-2.0.1, metadata-1.11.0, ordering-0.6, rerunfailures-9.1.1, xdist-2.2.0, seleniumbase-1.52.2
collected 3 items

get_random_data.py ... [100%]

===== 3 passed in 44.38s =====
```

```
13
14 To test dates for randomness, let's import some dates. These come from https://codebeautify.org/generate-random-date
15
16 ![[c:/code/testing/randomdates/dategenerator.png]]
```

```
17
18 First, we read them in...
19
20 [r, echo=TRUE, results='show']
21 rdates = read.csv("c:\\code\\testing\\randomdates\\rd-5000-1plus.txt", header=FALSE)
22 names(rdates)=c("year", "month", "day", "hour", "min", "sec")
23 rdatesraw = read.delim("c:\\code\\testing\\randomdates\\dates.txt", sep="\\t", header=FALSE)
24 names(rdatesraw) = c("dates")
25 options(max.print=10)
26 rdatesraw[1:10,]
27
```

```
1651
1652
```

```
1653
```

```
1654
```

```
1655
```

```
1656
```

```
1657
```

```
1658
```

```
1659
```

```
1660
```

```
1661
```

```
1662
```

```
1663
```

```
1664
```

```
1665
```

```
1666
```

```
1667
```

```
1668
```

```
1669
```

```
1670
```

```
1671
```

```
1672
```

```
1673
```

```
1674
```

```
1675
```

```
1676
```

```
1677
```

```
1678
```

```
1679
```

```
1680
```

```
1681
```

```
1682
```

```
1683
```

```
1684
```

```
1685
```

```
1686
```

```
1687
```

```
1688
```

```
1689
```

```
1690
```

```
1691
```

```
1692
```

```
1693
```

```
1694
```

```
1695
```

```
1696
```

```
1697
```

```
1698
```

```
1699
```

```
1700
```

```
1701
```

```
1702
```

```
1703
```

```
1704
```

```
1705
```

```
1706
```

```
1707
```

```
1708
```

```
1709
```

```
1710
```

```
1711
```

```
1712
```

```
1713
```

```
1714
```

```
1715
```

```
1716
```

```
1717
```

```
1718
```

```
1719
```

```
1720
```

```
1721
```

```
1722
```

```
1723
```

```
1724
```

```
1725
```

```
1726
```

```
1727
```

```
1728
```

```
1729
```

```
1730
```

```
1731
```

```
1732
```

```
1733
```

```
1734
```

```
1735
```

```
1736
```

```
1737
```

```
1738
```

```
1739
```

```
1740
```

```
1741
```

```
1742
```

```
1743
```

```
1744
```

```
1745
```

```
1746
```

```
1747
```

```
1748
```

```
1749
```

```
1750
```

```
1751
```

```
1752
```

```
1753
```

```
1754
```

```
1755
```

```
1756
```

```
1757
```

```
1758
```

```
1759
```

```
1760
```

```
1761
```

```
1762
```

```
1763
```

```
1764
```

```
1765
```

```
1766
```

```
1767
```

```
1768
```

```
1769
```

```
1770
```

```
1771
```

```
1772
```

```
1773
```

```
1774
```

```
1775
```

```
1776
```

```
1777
```

```
1778
```

```
1779
```

```
1780
```

```
1781
```

```
1782
```

```
1783
```

```
1784
```

```
1785
```

```
1786
```

```
1787
```

```
1788
```

```
1789
```

```
1790
```

```
1791
```

```
1792
```

```
1793
```

```
1794
```

```
1795
```

```
1796
```

```
1797
```

```
1798
```

```
1799
```

```
1800
```

```
1801
```

```
1802
```

```
1803
```

```
1804
```

```
1805
```

```
1806
```

```
1807
```

```
1808
```

```
1809
```

```
1810
```

```
1811
```

```
1812
```

```
1813
```

```
1814
```

```
1815
```

```
1816
```

```
1817
```

```
1818
```

```
1819
```

```
1820
```

```
1821
```

```
1822
```

```
1823
```

```
1824
```

```
1825
```

```
1826
```

```
1827
```

```
1828
```

```
1829
```

```
1830
```

```
1831
```

```
1832
```

```
1833
```

```
1834
```

```
1835
```

```
1836
```

```
1837
```

```
1838
```

```
1839
```

```
1840
```

```
1841
```

```
1842
```

```
1843
```

```
1844
```

```
1845
```

```
1846
```

```
1847
```

```
1848
```

```
1849
```

```
1850
```

```
1851
```

```
1852
```

```
1853
```

```
1854
```

```
1855
```

```
1856
```

```
1857
```

```
1858
```

```
1859
```

```
1860
```

```
1861
```

```
1862
```

```
1863
```

```
1864
```

```
1865
```

```
1866
```

```
1867
```

```
1868
```

```
1869
```

```
1870
```

```
1871
```

```
1872
```

```
1873
```

```
1874
```

```
1875
```

```
1876
```

```
1877
```

```
1878
```

```
1879
```

```
1880
```

```
1881
```

```
1882
```

```
1883
```

```
1884
```

```
1885
```

```
1886
```

```
1887
```

```
1888
```

```
1889
```

```
1890
```

```
1891
```

```
1892
```

```
1893
```

```
1894
```

```
1895
```

```
1896
```

```
1897
```

```
1898
```

```
1899
```

```
1900
```

```
1901
```

```
1902
```

```
1903
```

```
1904
```

```
1905
```

```
1906
```

```
1907
```

```
1908
```

```
1909
```

```
1910
```

```
1911
```

```
1912
```

```
1913
```

```
1914
```

```
1915
```

```
1916
```

```
1917
```

```
1918
```

```
1919
```

```
1920
```

```
1921
```

```
1922
```

```
1923
```

```
1924
```

```
1925
```

```
1926
```

```
1927
```

```
1928
```

```
1929
```

```
1930
```

```
1931
```

```
1932
```

```
1933
```

```
1934
```

```
1935
```

```
1936
```

```
1937
```

```
1938
```

```
1939
```

```
1940
```

```
1941
```

```
1942
```

```
1943
```

```
1944
```

```
1945
```

```
1946
```

```
1947
```

```
1948
```

```
1949
```

```
1950
```

```
1951
```

```
1952
```

```
1953
```

```
1954
```

```
1955
```

```
1956
```

```
1957
```

```
1958
```

```
1959
```

```
1960
```

```
1961
```

```
1962
```

```
1963
```

```
1964
```

```
1965
```

```
1966
```

```
1967
```

```
1968
```

```
1969
```

```
1970
```

```
1971
```

```
1972
```

```
1973
```

```
1974
```

```
1975
```

```
1976
```

```
1977
```

```
1978
```

```
1979
```

```
1980
```

```
1981
```

```
1982
```

```
1983
```

```
1984
```

```
1985
```

```
1986
```

```
1987
```

```
1988
```

```
1989
```

```
1990
```

```
1991
```

```
1992
```

```
1993
```

```
1994
```

```
1995
```

```
1996
```

```
1997
```

```
1998
```

```
1999
```

```
2000
```

```
2001
```

```
2002
```

```
2003
```

```
2004
```

```
2005
```

```
2006
```

```
2007
```

```
2008
```

```
2009
```

```
2010
```

```
2011
```

```
2012
```

```
2013
```

```
2014
```

```
2015
```

```
2016
```

```
2017
```

```
2018
```

```
2019
```

```
2020
```

```
2021
```

```
2022
```

```
2023
```

```
2024
```

```
2025
```

```
2026
```

```
2027
```

```
2028
```

```
2029
```

```
2030
```

```
2031
```

```
2032
```

```
2033
```

```
2034
```

```
2035
```

```
2036
```

```
2037
```

```
2038
```

```
2039
```

```
2040
```

```
2041
```

```
2042
```

```
2043
```

```
2044
```

```
2045
```

```
2046
```

```
2047
```

```
2048
```

```
2049
```

```
2050
```

```
2051
```

```
2052
```

```
2053
```

```
2054
```

```
2055
```

```
2056
```

```
2057
```

```
2058
```

```
2059
```

```
2060
```

```
2061
```

```
2062
```

```
2063
```

```
2064
```

```
2065
```

```
2066
```

```
2067
```

```
2068
```

```
2069
```

```
2070
```

```
2071
```

```
2072
```

```
2073
```

```
2074
```

```
2075
```

```
2076
```

```
2077
```

```
2078
```

```
2079
```

```
2080
```

```
2081
```

```
2082
```

```
2083
```

```
2084
```

```
2085
```

```
2086
```

```
2087
```

```
2088
```

```
2089
```

```
2090
```

```
2091
```

```
2092
```

```
2093
```

```
2094
```

```
2095
```

```
2096
```

```
2097
```

```
2098
```

```
2099
```

```
2100
```

```
2101
```

```
2102
```

```
2103
```

```
2104
```

```
2105
```

```
2106
```

```
2107
```

```
2108
```

```
2109
```

```
2110
```

```
2111
```

```
2112
```

```
2113
```

```
2114
```

```
2115
```

```
2116
```

```
2117
```

```
2118
```

```
2119
```

```
2120
```

```
2121
```

```
2122
```

```
2123
```

```
2124
```

```
2125
```

```
2126
```

```
2127
```

```
2128
```

```
2129
```

```
2130
```

```
2131
```

```
2132
```

```
2133
```

```
2134
```

```
2135
```

```
2136
```

```
2137
```

```
2138
```

```
2139
```

```
2140
```

```
2141
```

```
2142
```

```
2143
```

```
2144
```

```
2145
```

```
2146
```

```
2147
```

```
2148
```

```
2149
```

```
2150
```

```
2151
```

```
2152
```

```
2153
```

```
2154
```

```
2155
```

```
2156
```

```
2157
```

```
2158
```

```
2159
```

```
2160
```

```
2161
```

```
2162
```

```
2163
```

```
2164
```

```
2165
```

```
2166
```

```
2167
```

```
2168
```

```
2169
```

```
2170
```

```
2171
```

```
2172
```

```
2173
```

```
2174
```

```
2175
```

```
2176
```

```
2177
```

```
2178
```

```
2179
```

```
2180
```

```
2181
```

```
2182
```

```
2183
```

```
2184
```

```
2185
```

```
2186
```

```
2187
```

```
2188
```

```
2189
```

```
2190
```

```
2191
```

```
2192
```

```
2193
```

```
2194
```

```
2195
```

```
2196
```

```
2197
```

```
2198
```

```
2199
```

```
2200
```

```
2201
```

```
2202
```

```
2203
```

```
2204
```

```
2205
```

```
2206
```

```
2207
```

```
2208
```

```
2209
```

```
2210
```

```
2211
```

```
2212
```

```
2213
```

```
2214
```

```
2215
```

```
2216
```

```
2217
```

```
2218
```

```
2219
```

```
2220
```

```
2221
```

```
2222
```

```
2223
```

```
2224
```

```
2225
```

```
2226
```

```
2227
```

```
2228
```

```
2229
```

```
2230
```

```
2231
```

```
2232
```

```
2233
```

```
2234
```

```
2235
```

```
2236
```

```
2237
```

```
2238
```

```
2239
```

```
2240
```

```
2241
```

```
2242
```

```
2243
```

```
2244
```

```
2245
```

```
2246
```

```
2247
```

```
2248
```

```
2249
```

```
2250
```

```
2251
```

```
2252
```

```
2253
```

```
2254
```

```
2255
```

```
2256
```

```
2257
```

```
2258
```

```
2259
```

```
2260
```

```
2261
```

```
2262
```

```
2263
```

```
2264
```

```
2265
```

```
2266
```

```
2267
```

```
2268
```

```
2269
```

```
2270
```

```
2271
```

```
2272
```

```
2273
```

```
2274
```

```
2275
```

```
2276
```

```
2277
```

```
2278
```

```
2279
```

```
2280
```

```
2281
```

```
2282
```

```
2283
```

```
2284
```

```
2285
```

```
2286
```

```
2287
```

```
2288
```

```
2289
```

```
2290
```

```
2291
```

```
2292
```

```
2293
```

```
2294
```

```
2295
```

```
2296
```

```
2297
```

```
2298
```

```
2299
```

```
2300
```

```
2301
```

```
2302
```

```
2303
```

```
2304
```

```
2305
```

```
2306
```

```
2307
```

```
2308
```

```
2309
```

```
2310
```

```
2311
```

```
2312
```

```
2313
```

```
2314
```

```
2315
```

```
2316
```

```
2317
```

```
2318
```

```
2319
```

```
2320
```

```
2321
```

```
2322
```

```
2323
```

```
2324
```

```
2325
```

```
2326
```

```
2327
```

```
2328
```

```
2329
```

```
2330
```

```
2331
```

```
2332
```

```
2333
```

```
2334
```

```
2335
```

```
2336
```

```
2337
```

```
2338
```

```
2339
```

```
2340
```

```
2341
```

```
2342
```

```
2343
```

```
2344
```

```
2345
```

```
2346
```

```
2347
```

```
2348
```

```
2349
```

```
2350
```

```
2351
```

```
2352
```

```
2353
```

```
2354
```

```
2355
```

```
2356
```

```
2357
```

```
2358
```

```
2359
```

```
2360
```

```
2361
```

```
2362
```

```
2363
```

```
2364
```

```
2365
```

```
2366
```

```
2367
```

```
2368
```

```
2369
```

```
2370
```

```
2371
```

```
2372
```

```
2373
```

```
2374
```

```
2375
```

```
2376
```

```
2377
```

```
2378
```

```
2379
```

```
2380
```

```
2381
```

```
2382
```

```
2383
```

```
2384
```

```
2385
```

```
2386
```

```
2387
```

```
2388
```

```
2389
```

```
2390
```

```
2391
```

```
2392
```

```
2393
```

```
2394
```

```
2395
```

```
2396
```

```
2397
```

```
2398
```

```
2399
```

```
2400
```

```
2401
```

```
2402
```

```
2403
```

```
2404
```

```
2405
```

```
2406
```

```
2407
```

```
2408
```

```
2409
```

```
2410
```

```
2411
```

```
2412
```

```
2413
```

```
2414
```

```
2415
```

```
2416
```

```
2417
```

```
2418
```

```
2419
```

```
2420
```

```
2421
```

```
2422
```

```
2423
```

```
2424
```

```
2425
```

```
2426
```

```
2427
```

```
2428
```

```
2429
```

```
2430
```

```
2431
```

```
2432
```

```
2433
```

```
2434
```

```
2435
```

```
2436
```

```
2437
```

```
2438
```

```
2439
```

```
2440
```

```
2441
```

```
2442
```

```
2443
```

```
2444
```

```
2445
```

```
2446
```

```
2447
```

```
2448
```

```
2449
```

```
2450
```

```
2451
```

```
2452
```

```
2453
```

```
2454
```

```
2455
```

```
2456
```

```
2457
```

```
2458
```

```
2459
```

```
2460
```

```
2461
```

```
2462
```

```
2463
```

```
2464
```

```
2465
```

```
2466
```

```
2467
```

```
2468
```

```
2469
```

```
2470
```

```
2471
```

```
2472
```

```
2473
```

```
2474
```

```
2475
```

```
2476
```

```
2477
```

```
2478
```

```
2479
```

```
2480
```

```
2481
```

```
2482
```

```
2483
```

```
2484
```

```
2485
```

```
2486
```

```
2487
```

```
2488
```

```
2489
```

```
2490
```

```
2491
```

```
2492
```

```
2493
```

```
2494
```

```
2495
```

```
2496
```

```
2497
```

```
2498
```

```
2499
```

```
2500
```

```
2501
```

```
2502
```

```
2503
```

```
2504
```

```
2505
```

```
2506
```

```
2507
```

```
2508
```

```
2509
```

```
2510
```

```
2511
```

```
2512
```

```
2513
```

```
2514
```

```
2515
```

```
2516
```

```
2517
```

```
2518
```

```
2519
```

```
2520
```

```
2521
```

```
2522
```

```
2523
```

```
2524
```

```
2525
```

```
2526
```

```
2527
```

```
2528
```

```
2529
```

```
2530
```

```
2531
```

```
2532
```

```
2533
```

```
2534
```

```
2535
```

```
2536
```

```
2537
```

```
2538
```

```
2539
```

```
2540
```

```
2541
```

```
2542
```

```
2543
```

```
2544
```

```
2545
```

```
2546
```

```
2547
```

```
2548
```

```
2549
```

```
2550
```

```
2551
```

```
2552
```

```
2553
```

```
2554
```

```
2555
```

```
2556
```

```
2557
```

```
2558
```

```
2559
```

```
2560
```

```
2561
```

```
2562
```

```
2563
```

```
2564
```

```
2565
```

```
2566
```

```
2567
```

```
2568
```

```
2569
```

```
2570
```

```
2571
```

```
2572
```

```
2573
```

```
2574
```

```
2575
```

```
2576
```

```
2577
```

```
2578
```

```
2579
```

```
2580
```

```
2581
```

```
2582
```

```
2583
```

```
2584
```

```
2585
```

```
2586
```

```
2587
```

```
2588
```

```
2589
```

```
2590
```

```
2591
```

```
2592
```

```
2593
```

```
2594
```

```
2595
```

```
2596
```

```
2597
```

```
2598
```

```
2599
```

```
2600
```

```
2601
```

```
2602
```

```
2603
```

```
2604
```

```
2605
```

```
2606
```

```
2607
```

```
2608
```

```
2609
```

```
2610
```

```
2611
```

```
2612
```

```
2613
```

```
2614
```

```
2615
```

```
2616
```

```
2617
```

```
2618
```

```
2619
```

```
2620
```

```
2621
```

```
2622
```

```
2623
```

```
2624
```

```
2625
```

```
2626
```

```
2627
```

```
2628
```

```
2629
```

```
2630
```

```
2631
```

```
2632
```

```
2633
```

```
2634
```

```
2635
```

```
2636
```

```
2637
```

```
2638
```

```
2639
```

```
2640
```

```
2641
```

```
2642
```

```
2643
```

```
2644
```

```
2645
```

```
2646
```

```
2647
```

```
2648
```

```
2649
```

```
2650
```

```
2651
```

```
2652
```

```
2653
```

```
2654
```

```
2655
```

```
2656
```

```
2657
```

```
2658
```

```
2659
```

```
2660
```

```
2661
```

```
2662
```

```
2663
```

```
2664
```

```
2665
```

```
2666
```

```
2667
```

```
2668
```

```
2669
```

```
2670
```

```
2671
```

```
2672
```

```
2673
```

```
2674
```

```
2675
```

```
2676
```

```
2677
```

```
2678
```

```
2679
```

```
2680
```

```
2681
```

```
2682
```

```
2683
```

```
2684
```

```
2685
```

```
2686
```

```
2687
```

```
2688
```

```
2689
```

```
2690
```

```
2691
```

```
2692
```

```
2693
```

```
2694
```

```
2695
```

```
2696
```

```
2697
```

```
2698
```

```
2699
```

```
2700
```

```
2701
```

```
2702
```

```
2703
```

```
2704
```

```
2705
```

```
2706
```

```
2707
```

```
2708
```

```
2709
```

```
2710
```

```
2711
```

```
2712
```

```
2713
```

```
2714
```

```
2715
```

```
2716
```

```
2717
```

```
2718
```

```
2719
```

```
2720
```

```
2721
```

```
2722
```

```
2723
```

```
2724
```

```
2725
```

```
2726
```

```
2727
```

```
2728
```

```
2729
```

```
2730
```

```
2731
```

```
2732
```

```
2733
```

```
2734
```

```
2735
```

```
2736
```

```
2737
```

```
2738
```

```
2739
```

```
2740
```

```
2741
```

```
2742
```

```
2743
```

```
2744
```

```
2745
```

```
2746
```

```
2747
```

```
2748
```

```
2749
```

```
2750
```

```
2751
```

```
2752
```

```
2753
```

```
2754
```

```
2755
```

```
2756
```

```
2757
```

```
2758
```

```
2759
```

```
2760
```

```
2761
```

```
2762
```

```
2763
```

```
2764
```

```
2765
```

```
2766
```

```
2767
```

```
2768
```

```
2769
```

```
2770
```

```
2771
```

```
2772
```

```
2773
```

```
2774
```

```
2775
```

```
2776
```

```
2777
```

```
2778
```

```
2779
```

```
2780
```

```
2781
```

```
2782
```

```
2783
```

```
2784
```

```
2785
```

```
2786
```

```
2787
```

```
2788
```

```
2789
```

```
2790
```

```
2791
```

```
2792
```

```
2793
```

```
2794
```

```
2795
```

```
2796
```

```
2797
```

```
2798
```

```
2799
```

```
2800
```

```
2801
```

```
2802
```

```
2803
```

```
2804
```

```
2805
```

```
2806
```

```
2807
```

```
2808
```

```
2809
```

```
2810
```

```
2811
```

```
2812
```

```
2813
```

```
2814
```

```
2815
```

```
2816
```

```
2817
```

```
2818
```

```
2819
```

```
2820
```

```
2821
```

```
2822
```

```
2823
```

```
2824
```

```
2825
```

```
2826
```

```
2827
```

```
2828
```

```
2829
```

```
2830
```

```
2831
```

```
2832
```

```
2833
```

```
2834
```

```
2835
```

```
2836
```

```
2837
```

```
2838
```

```
2839
```

```
2840
```

```
2841
```

```
2842
```

```
2843
```

```
2844
```

```
2845
```

```
2846
```

```
2847
```

```
2848
```

```
2849
```

```
2850
```

```
2851
```

```
2852
```

```
2853
```

```
2854
```

```
2855
```

```
2856
```

```
2857
```

```
2858
```

```
2859
```

```
2860
```

```
2861
```

```
2862
```

```
2863
```

```
2864
```

```
2865
```

```
2866
```

```
2867
```

```
2868
```

```
2869
```

```
2870
```

```
2871
```

```
2872
```

```
2873
```

```
2874
```

```
2875
```

```
2876
```

```
2877
```

```
2878
```

```
2879
```

```
2880
```

```
2881
```

```
2882
```

```
2883
```

```
2884
```

```
2885
```

```
2886
```

```
2887
```

```
2888
```

```
2889
```

```
2890
```

```
2891
```

```
2892
```

```
2893
```

```
2894
```

```
2895
```

```
2896
```

```
2897
```

```
2898
```

```
2899
```

```
2900
```

```
2901
```

```
2902
```

```
2903
```

```
2904
```

```
2905
```

```
2906
```

```
2907
```

```
2908
```

```
2909
```

```
2910
```

```
2911
```

```
2912
```

```
2913
```

```
2914
```

```
2915
```

```
2916
```

```
2917
```

```
2918
```

```
2919
```

```
2920
```

```
2921
```

```
2922
```

```
2923
```

```
2924
```

```
2925
```

```
2926
```

```
2927
```

```
2928
```

```
2929
```

```
2930
```

```
2931
```

```
2932
```

```
2933
```

```
2934
```

```
2935
```

```
2936
```

```
2937
```

```
2938
```

```
2939
```

```
2940
```

```
2941
```

```
2942
```

```
2943
```

```
2944
```

```
2945
```

```
2946
```

```
2947
```

```
2948
```

```
2949
```

```
2950
```

```
2951
```

```
2952
```

```
2953
```

```
2954
```

```
2955
```

```
2956
```

```
2957
```

Final Argument: An Appeal to Pride


Nobody in our industry is called a “manual programmer” or “automated programmer.”

Ask yourself, why?

Answer: Because everyone already knows that programming is done with the mind, and not the hands.

Why don't people think the same thing about testing? Let's change that!

Automated Programmer

Share 



SuperBOT-1

Automated IC Programmer

[SHOW NOW](#)

SuperBOT-II

Automated IC Programmer

[SHOW NOW](#)

FlashPAK III

Highest Quality Manual
Programmer

The world's most trusted manual programmer for quality programming



FlashPAK III

With

FlashCORE III
TECHNOLOGY