

□ ! 가?

Size Korea

가

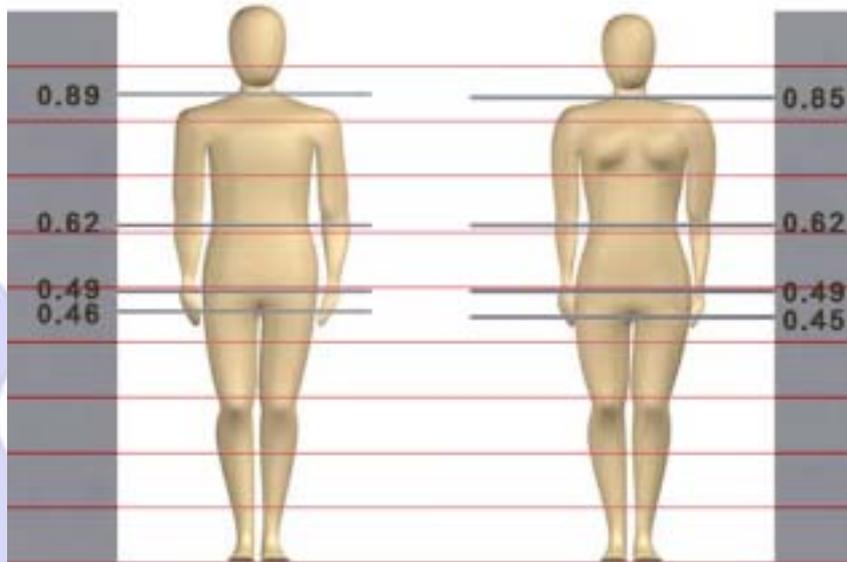
가

1

, 가 ,

가

가



□

가?

(average body type) (standard body type) (high proportion range)

(average body type) (mean)가

가

(1) 'pattern' 'size' 가

pattern

()가

가

가

가

size

pattern

/ /

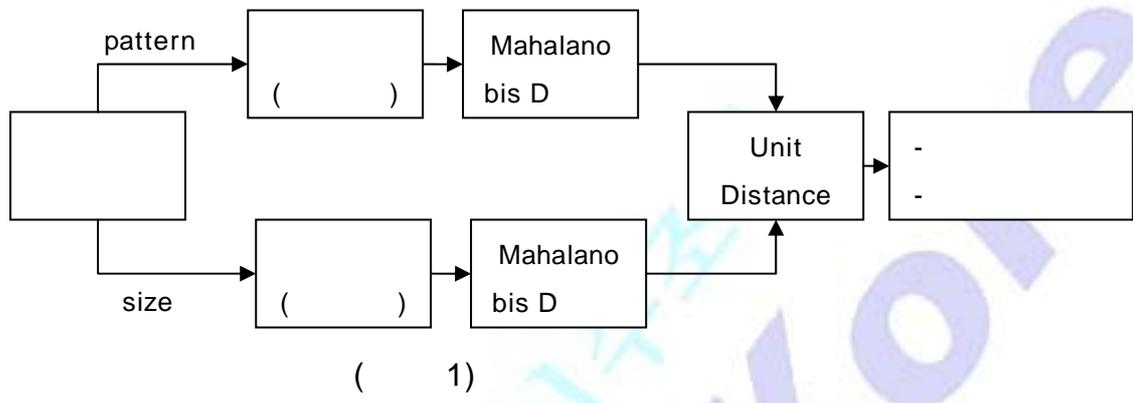
가

가

pattern

size

가



(factor analysis)

(artificial variable)

(factor)



가

가
가
가

(linear combination)

(inverse matrix)

가
(non-singular matrix)

(correlation)

MSA(measures

MSA

가
of sampling adequacy)

0.5

pattern size 가

screen plot

Eigenvalues가 1.0

varimax (factor loadings) (significance)

가 300

0.3

가

가

가

()

(factor scores)가

119

119

8

8

()

119

0, 1

(Mahalanobis)

p

n

가

가

, 300

119

n=300,

p=119가

X

Mahalanobis Distance(MD)

(Euclidean distance)

$$D^2 = (\mathbf{X} - \bar{\mathbf{X}})\mathbf{S}^{-1}(\mathbf{X} - \bar{\mathbf{X}})$$

\mathbf{S} (covariance matrix) \mathbf{S}^{-1} (inverse matrix)

MD

(I) Euclidean distance

MD

\mathbf{S}

D^2

p

MD

$$P\{(\mathbf{X} - \bar{\mathbf{X}})\mathbf{S}^{-1}(\mathbf{X} - \bar{\mathbf{X}}) \leq \chi^2(p, \alpha)\} = 1 - \alpha$$

$\alpha=0.5$

\mathbf{X} 가

50%

25%

50%

가

가

50%

2)

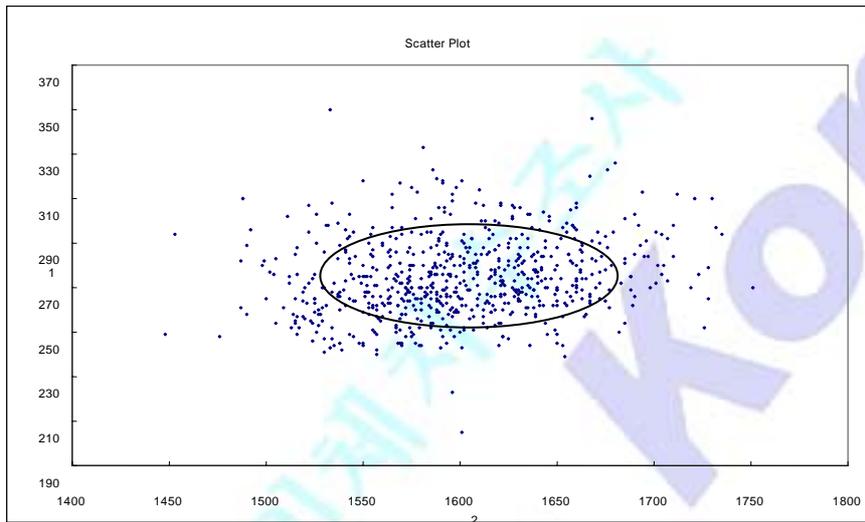
가

50%



50%

가



(2)

MD

D^2 50%

pattern size

가

Pattern size

D^2
size가 2

D^2

D^2 50%

pattern 8

pattern size 가

pattern size

50% 가
 D^2 , pattern $\chi^2(8,0.5) = 7.344$, size $\chi^2(2,0.5) = 1.386$

가



가

D^2 ()
 D^2
 distance , D^2 Euclidean
 UD_i pattern size 가

(MD)²

$$UD_i = \sqrt{(\text{MD Pattern})_i^2 / n_p} + \sqrt{(\text{MD Size})_i^2 / n_s}$$

pattern size D^2 , n_p, n_s pattern size
 distance Euclidean
 distance unit

가

unit distance가

pattern size

가 가



가

DB

가

DB

standardized scoring coefficients matrix

DB

(factor scores)

$$F = Z S$$

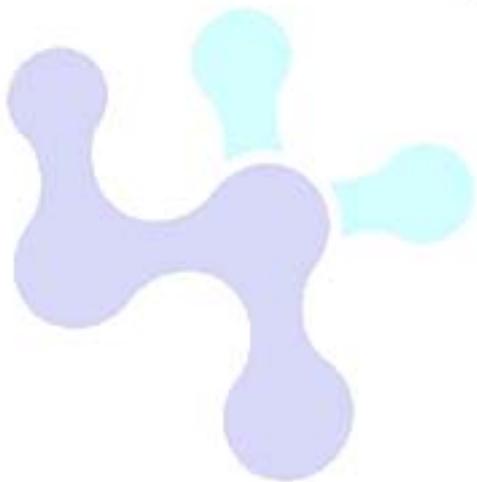
F = factor scores, Z = standardized values of observed variables, S= standardized scoring coefficients

distance pattern size 가 unit
 . Unit distance Euclidean distance ,
 pattern 0 1 m

(F_i) , i
Euclidean distance

$$\sqrt{\sum_{j=1}^m F_{ij}^2 / m}$$

. unit distance ,
가 가 가 가
가 .



한국인 인체 치주 조사
Size Korea

□

가 가 가 가

positioning

20, 30, 40, 50, 60 가

20 가 , 70 가

30~40

가

(1)

5~10 가

[Hair et al. 1995]

119

595

87 가 , 가
435 가 . 가

(1)

	20 (20~30)	30 (30~40)	40 (40~50)	50 (50~60)	60 (60~70)
	692	736	412	373	386
	680	711	409	382	400



□

pattern size

pattern size

. Pattern

, size

()

() 가

pattern

, size

pattern

size

pattern

가

(2)

Pattern

	20	30	40	50	60
1					
2			-		
3					
4					-
5	-	-		-	
6				-	
7					
8					
9					

(3)

size

	20	30	40	50	60
1	()	()	()	()	()
2	()	()	()	()	()

(4) Pattern

	20	30	40	50	60
1					
2	-	-		-	-
3					
4					
5	-			-	
6			-		
7					
8					
9					

(5) size

	20	30	40	50	60
1	()	()	()	()	()
2	()	()	()	()	()



(6)

	20	30	40	50	60
(101)	1877.0	1852.6	1840.8	1826.8	1800.3
(102)	1597.3	1574.1	1562.1	1543.2	1518.3
(103)	1486.7	1466.2	1453.4	1436.6	1409.7
(104)	1357.2	1338.5	1329.4	1314.6	1293.0
(105)	1288.7	1269.6	1261.9	1247.8	1223.7
(106) 가	1298.4	1281.6	1273.8	1259.5	1236.1
(107)	1190.9	1171.6	1162.0	1143.7	1121.6
(108)	977.3	965.6	958.0	943.9	924.0
(109)	777.3	758.5	750.1	740.7	731.2
(110)	721.3	702.1	694.1	683.3	667.2
(111)	716.7	709.5	700.4	691.6	668.1
(112)	994.0	973.2	966.0	949.6	926.3
(113)	937.5	915.3	906.9	889.5	866.2
(114) 가	858.9	839.7	832.8	819.5	802.8
(115)	407.1	398.9	397.5	395.5	387.5
(116)가	271.5	280.5	283.0	291.3	288.1
(117) 가	269.0	280.6	285.6	297.2	298.3
(118)	237.1	251.0	260.3	276.3	284.7
(119)	269.6	281.7	291.2	306.5	313.4
(120)	322.4	324.5	326.1	329.8	324.4
(121)	91.9	98.5	101.6	106.0	104.5
(122)가	178.3	187.5	196.0	206.8	212.9
(123) 가	206.2	218.3	228.9	245.4	254.7
(124)	173.5	192.1	203.2	227.7	243.9
(125)	178.7	193.9	201.8	225.5	246.0
(126)	207.0	214.5	216.4	225.8	231.4
(127)	272.6	271.1	271.9	266.3	259.1
(128)	635.8	636.4	635.3	631.3	625.7
(129)	659.2	657.8	654.8	660.1	656.5
(130)	218.1	232.1	243.2	257.7	270.0
(131)	90.8	92.9	93.5	96.8	101.1
(132)	52.9	55.1	57.0	59.5	59.2
(201)	323.8	324.8	327.5	335.8	333.7
(202)	380.7	384.0	387.4	398.0	399.0

(203)		321.1	324.6	325.0	327.1	325.6
(204)		311.3	321.4	325.4	334.1	337.4
(205)	()	172.9	175.8	177.2	185.5	189.5
(206)						
(207)		366.1	375.3	375.4	382.3	382.2
(208)가		822.3	852.9	872.2	897.0	904.9
(209) 가		820.7	856.4	885.4	930.7	946.7
(210) 가 ()		717.0	748.7	774.9	809.4	823.8
(211)		673.1	724.9	755.5	817.4	863.4
(212)		744.9	784.2	812.4	871.9	918.6
(213)		908.4	912.5	921.3	932.8	927.6
(214)		537.4	540.3	546.7	545.9	530.8
(215)		471.7	468.7	470.7	471.8	461.0
(216)		346.4	341.1	341.7	347.0	342.8
(217)		320.3	316.3	317.1	323.1	318.2
(218)		339.0	339.1	341.1	339.7	329.0
(219)		206.0	205.0	206.8	208.1	206.3
(220)		232.9	232.4	235.2	236.7	237.2
(221)		126.5	125.7	125.8	123.0	124.0
(222)		168.6	170.5	171.6	176.5	178.5
(223)		380.8	384.4	380.8	386.1	388.4
(224)		435.5	440.6	439.8	444.3	448.8
(225)		964.2	957.4	950.3	946.4	934.5
(226)		1376.5	1361.8	1354.5	1343.2	1323.3
(227)		275.8	269.2	265.1	261.8	257.2
(228)		399.1	395.3	394.9	392.8	389.0
(229)		365.9	368.8	370.7	369.4	366.8
(230)		345.6	355.7	358.3	363.5	363.9
(231)		326.7	337.8	344.0	357.2	368.0
(232)		473.9	479.2	482.0	489.2	486.8
(233)	()	249.3	262.2	271.2	282.1	293.2
(234)		397.5	404.0	409.9	415.4	414.1
(235)		306.8	304.7	305.4	305.8	304.8
(236)		532.1	525.7	526.6	528.3	526.2
(237)		435.0	425.1	422.9	421.8	417.0
(238)		756.8	748.6	743.6	738.0	731.7
(239)		363.5	377.8	389.1	400.8	406.4
(240)		255.4	269.4	280.3	290.8	289.6
(241)		246.6	252.4	258.7	265.0	263.4
(242)		145.5	148.8	153.1	157.2	157.9
(243)		228.6	226.0	226.1	228.9	213.5
(244) 가		1002.3	983.1	976.8	960.7	938.5
(245)		1477.4	1495.2	1512.5	1516.6	1521.3
(246)		721.5	726.7	742.8	736.7	735.5
(247)		611.1	614.1	625.9	618.1	610.6
(301)		864.8	861.4	851.3	839.8	822.9

(302)		753.3	751.8	741.7	731.7	713.9
(303)		628.0	627.3	620.8	612.4	599.4
(304)		560.3	558.7	554.3	546.5	531.0
(305)		247.3	251.7	247.1	239.8	228.5
(306)		134.8	135.6	137.5	137.2	133.7
(307)		478.7	470.2	468.5	463.5	456.8
(308)		374.3	367.1	364.0	356.9	351.9
(309)		542.1	536.5	538.5	537.1	535.1
(310)		446.6	441.8	443.6	442.9	442.0
(311)		205.0	223.3	235.6	258.9	278.4
(312)		311.0	304.4	304.1	303.0	300.6
(313)		245.6	239.3	238.0	240.3	238.0
(314)		413.5	407.8	408.1	409.7	408.3
(315)		305.0	298.2	296.9	299.6	298.0
(316)		193.4	211.4	224.9	248.9	266.7
(317)		360.1	360.2	360.1	356.6	351.4
(318)		409.2	418.8	423.9	426.8	424.8
(319)		397.7	421.5	430.7	448.0	450.1
(320)		347.1	346.7	346.2	346.7	341.6
(401)		176.5	174.3	175.8	177.5	177.6
(402)		152.1	153.2	151.6	150.1	150.6
(403)		221.5	218.0	218.5	218.7	219.3
(404)		114.5	114.9	115.1	114.8	116.2
(405)		549.2	546.3	546.2	547.8	546.2
(406)		362.9	361.7	360.1	356.6	359.3
(407)		349.1	345.1	343.3	348.9	342.9
(408)		52.5	52.1	50.6	51.7	51.1
(409)		174.6	174.6	175.7	175.2	176.5
(410)		101.0	101.6	102.2	102.7	103.6
(411)		75.5	77.0	78.3	78.7	79.5
(412)	가	65.2	64.8	65.7	65.3	65.1
(413)	가	17.0	17.4	17.7	18.0	18.4
(414)	가	14.8	15.1	15.4	15.8	16.2
(415)		24.0	24.3	25.0	25.3	26.0
(416)		97.1	92.6	89.8	87.4	83.4
(417)		178.9	183.7	187.1	189.3	191.2
(418)		90.9	92.4	92.1	93.2	92.2
(419)		231.7	228.3	228.5	228.5	226.5
(420)가		61.6	61.5	61.3	61.0	60.1

(7)

	20	30	40	50	60
(101)	2044.2	2015.9	1987.3	1954.8	1940.3
(102)	1735.0	1708.6	1687.8	1661.0	1645.8
(103)	1618.6	1593.2	1572.3	1548.2	1533.8
(104)	1478.5	1457.7	1440.7	1417.1	1408.3
(105)	1400.6	1382.8	1366.2	1346.3	1338.9
(106) 가	1411.2	1394.2	1376.7	1357.4	1349.5
(107)	1286.0	1268.6	1250.1	1229.7	1220.3
(108)	1055.6	1047.9	1035.2	1018.0	1008.8
(109)	848.6	835.9	820.4	810.2	807.5
(110)	795.8	774.7	764.5	752.5	748.2
(111)	764.8	762.5	756.3	740.0	731.9
(112)	1074.3	1050.1	1033.2	1016.6	1011.1
(113)	1022.6	1002.6	988.2	968.0	961.9
(114) 가	922.6	913.1	898.7	884.8	883.5
(115)	442.5	438.6	435.3	423.3	426.7
(116)가	313.1	319.2	317.0	312.4	306.0
(117) 가	301.6	307.5	304.1	303.6	298.7
(118)	272.2	284.1	288.5	290.3	291.3
(119)	284.9	294.0	298.0	297.0	297.8
(120)	330.7	332.2	330.3	326.6	325.1
(121)	118.1	116.5	116.2	112.5	108.5
(122)가	206.1	211.0	214.9	217.2	222.5
(123) 가	213.6	222.2	228.0	232.0	234.9
(124)	200.7	220.9	231.1	237.2	241.7
(125)	197.8	216.2	225.7	229.9	234.5
(126)	238.6	239.9	240.5	237.6	238.6
(127)	278.5	275.4	268.7	264.1	262.9
(128)	682.7	683.1	676.2	664.5	660.1
(129)	698.3	699.8	693.9	689.8	695.0
(130)	212.4	232.7	237.4	244.4	241.9
(131)	85.4	93.9	92.0	98.1	97.4
(132)	68.9	71.4	70.8	68.4	66.4
(201)	345.8	358.0	364.2	356.9	354.2
(202)	399.1	409.4	412.3	409.0	408.4
(203)	363.3	365.8	362.7	356.0	354.8
(204)	357.3	370.1	367.8	362.8	366.7
(205) ()					
(206)	369.2	380.1	383.8	380.2	378.9
(207)					
(208)가	956.2	971.8	974.7	959.8	954.1
(209) 가	907.0	934.9	942.4	938.2	939.3
(210) 가 ()					
(211)	777.2	835.9	855.9	869.1	877.2
(212)	798.3	848.9	866.3	877.5	881.7

(213)		945.5	951.8	951.0	938.5	937.3
(214)		564.6	564.2	558.6	540.1	527.2
(215)		520.1	512.7	506.6	490.8	477.9
(216)		373.0	369.8	368.8	362.5	363.2
(217)		347.2	346.2	347.3	340.4	341.2
(218)		378.9	374.1	369.2	360.2	354.1
(219)		221.7	223.3	223.1	220.9	217.3
(220)		258.5	259.3	260.2	259.2	257.5
(221)		135.6	133.3	129.0	125.7	125.7
(222)		196.5	197.5	199.5	197.2	198.0
(223)		418.7	428.2	429.5	422.2	421.2
(224)		467.2	473.3	472.3	469.1	467.0
(225)		1033.3	1027.0	1015.8	1002.7	995.6
(226)		1492.3	1476.1	1459.8	1437.1	1432.9
(227)		298.1	285.6	280.7	275.1	273.0
(228)		434.2	436.6	429.2	423.8	415.0
(229)		402.2	410.2	403.3	401.1	390.2
(230)		386.2	396.3	390.7	392.5	381.4
(231)		348.6	354.5	356.1	355.2	353.2
(232)		512.5	522.3	526.0	518.0	511.9
(233)	()					
(234)		428.3	435.7	438.0	431.0	428.5
(235)		339.5	332.2	329.7	327.6	327.9
(236)		583.3	575.2	570.2	565.9	568.7
(237)		476.7	462.6	459.0	451.3	451.7
(238)		844.2	821.9	811.0	791.6	793.9
(239)		427.5	434.5	436.0	428.2	428.3
(240)		297.5	306.8	309.3	303.3	295.2
(241)		280.0	288.3	291.8	287.4	286.5
(242)		162.3	167.5	169.2	170.1	170.1
(243)		208.9	207.8	202.9	197.4	194.2
(244)	가	1077.6	1053.8	1035.8	1018.4	1014.7
(245)		1596.1	1626.9	1626.6	1602.9	1590.2
(246)		760.5	766.3	763.3	752.6	745.7
(247)		658.1	669.9	672.3	651.6	643.3
(301)		930.3	927.0	916.2	903.9	887.5
(302)		811.9	811.5	800.4	790.8	775.3
(303)		677.9	676.3	670.3	660.4	649.8
(304)		597.4	599.0	594.3	589.1	578.4
(305)		255.9	263.0	261.3	258.2	248.4
(306)		157.2	154.7	152.3	147.0	141.1
(307)		521.9	509.5	500.5	495.1	492.9
(308)		411.4	398.5	392.4	386.1	383.2
(309)		581.9	568.6	561.6	558.4	554.5
(310)		477.3	465.3	463.5	460.3	454.5
(311)		227.0	244.3	257.4	260.8	266.6

(312)		340.7	336.0	333.8	331.9	332.4
(313)		271.5	266.6	263.3	259.9	261.9
(314)		456.2	447.6	443.9	440.4	441.3
(315)		334.6	324.4	323.1	318.5	319.6
(316)		214.4	237.9	250.1	251.6	255.9
(317)		397.8	400.8	395.5	386.5	381.1
(318)		470.4	471.0	463.8	453.6	444.9
(319)		486.2	477.0	466.0	463.0	456.3
(320)		347.1	350.1	347.0	341.9	341.8
(401)		185.8	184.7	184.0	183.0	182.7
(402)		160.0	161.2	160.4	158.2	158.8
(403)		235.2	236.4	236.3	234.0	233.4
(404)		120.2	119.4	120.5	119.9	121.9
(405)		573.7	573.4	570.8	566.4	565.7
(406)		381.3	380.6	378.7	371.0	372.0
(407)		362.4	367.7	360.5	360.2	358.4
(408)		56.4	57.1	57.5	56.1	55.4
(409)		187.2	185.5	185.3	183.9	183.7
(410)		108.7	107.0	107.0	105.6	105.4
(411)		82.2	84.3	84.2	84.3	84.3
(412)	가	70.0	69.6	69.7	69.3	69.6
(413)	가	18.6	19.0	19.2	19.5	19.8
(414)	가	15.4	16.3	16.6	16.7	17.0
(415)		26.1	26.2	26.7	26.4	27.0
(416)		102.5	99.0	96.0	95.2	96.1
(417)		201.6	207.5	207.9	208.8	207.6
(418)		100.3	99.1	21.7	98.6	98.6
(419)		253.5	249.3	31.7	246.4	244.6
(420)가		68.7	68.7	59.4	65.9	67.0

□

size

가

가



가 가

Rasband(1994)

8가

(8) Rasband

1. ()	2.	3.	4.
5.	6.	7.	8.

Rasband

가

가

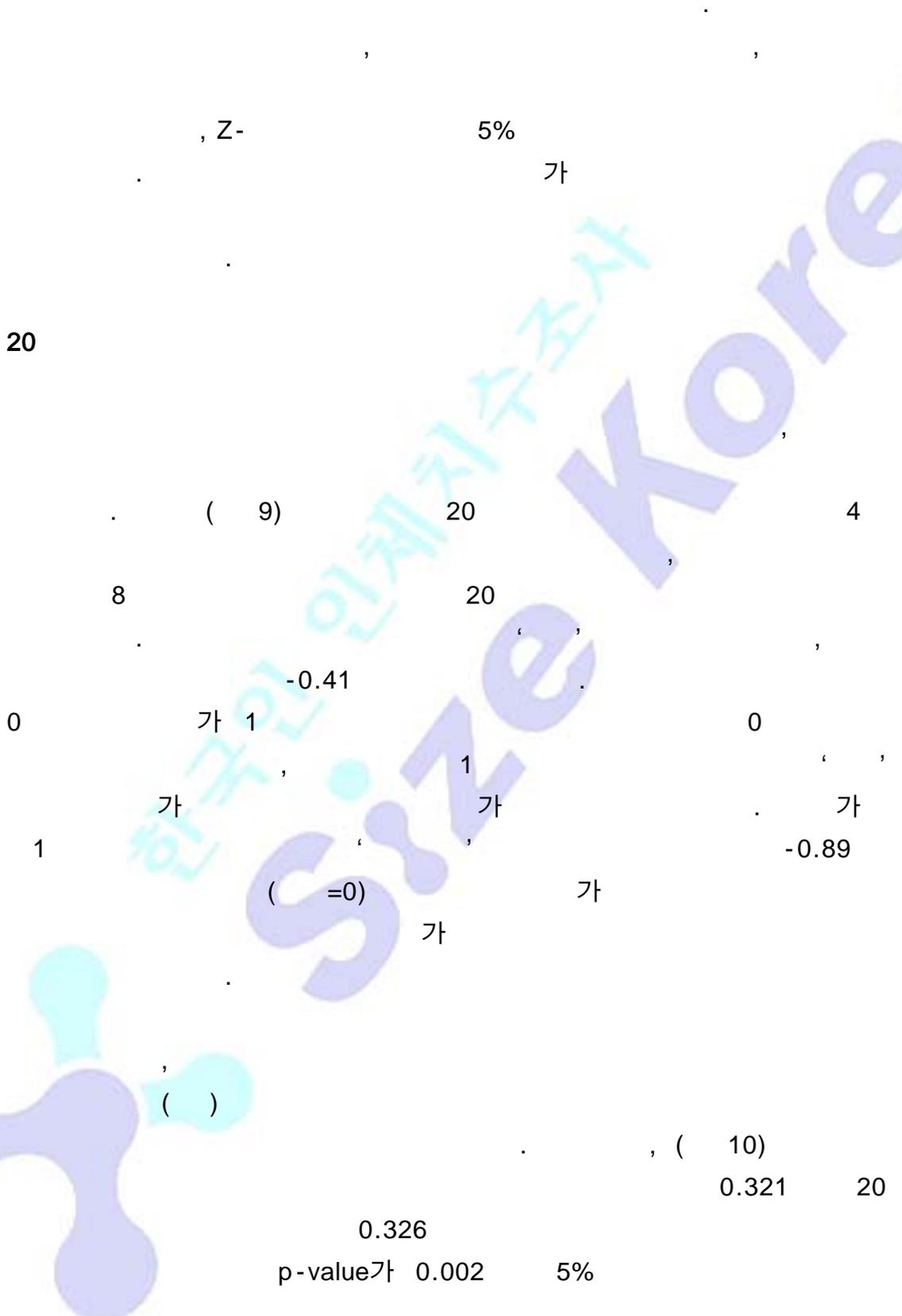
가

가

(factor)

(cluster

analysis)



가 , 가
 가 . (9)
 20 4가 ,



(9) 20 pattern

	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	
1	P4(-0.41)	P2(-0.89)	P7(0.27)	P7(0.36)	P7(0.29)	P5(-0.15)	P6(0.11)	P5(-0.04)	196
2	P10(1.45)	P6(0.16)	P6(0.09)	P7(0.45)	P6(0.05)	P6(0.16)	P7(0.25)	P7(0.34)	117
3	P5(-0.20)	P6(0.18)	P5(-0.12)	P3(-0.69)	P5(-0.06)	P8(0.73)	P6(0.14)	P4(-0.37)	195
4	P4(-0.30)	P8(0.71)	P5(-0.23)	P6(0.06)	P4(-0.30)	P3(-0.77)	P4(-0.46)	P6(0.24)	169

(10) 20

								p-value	(5%)
1	/	196	0.321	0.023	0.262	0.394	0.326	0.002	*
	/	196	0.867	0.046	0.769	0.983	0.881	0.000	*
	/	196	0.168	0.011	0.139	0.202	0.171	0.001	*
	/	196	0.455	0.031	0.378	0.538	0.466	0.000	*
	가 /	196	0.504	0.027	0.440	0.579	0.514	0.000	*
	/	196	0.561	0.025	0.498	0.643	0.569	0.000	*
2	/	117	0.335	0.024	0.273	0.403	0.326	0.000	*
	/	117	0.893	0.053	0.740	1.024	0.881	0.012	*
	/	117	0.172	0.014	0.123	0.227	0.171	0.151	
	/	117	0.530	0.040	0.451	0.679	0.466	0.000	*
	가 /	117	0.577	0.038	0.511	0.706	0.514	0.000	*
	/	117	0.609	0.027	0.556	0.686	0.569	0.000	*
3	/	194	0.325	0.022	0.253	0.389	0.326	0.386	
	/	195	0.889	0.047	0.706	1.042	0.881	0.018	*
	/	194	0.171	0.012	0.097	0.201	0.171	0.171	
	/	195	0.464	0.033	0.397	0.568	0.466	0.141	
	가 /	195	0.512	0.031	0.442	0.596	0.514	0.276	
	/	195	0.570	0.028	0.521	0.686	0.569	0.327	
4	/	169	0.326	0.021	0.277	0.390	0.326	0.466	
	/	169	0.893	0.048	0.786	1.085	0.881	0.001	*
	/	169	0.172	0.011	0.143	0.223	0.171	0.016	*
	/	169	0.453	0.034	0.362	0.540	0.466	0.000	*
	가 /	169	0.501	0.032	0.426	0.590	0.514	0.000	*
	/	169	0.560	0.023	0.509	0.616	0.569	0.000	*

(29.0%), (19.3%), 20 (28.8%), (25.0%)

(3)

20

가

가

20

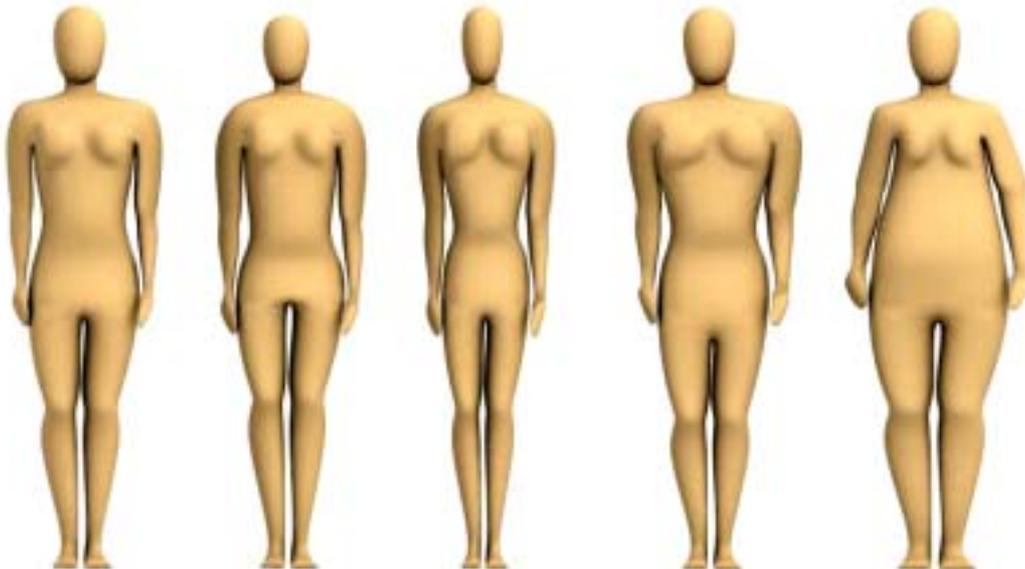
29%

40

40 (13) 4가
5) . (

() 40

	(%)	(40)
	34.4	,
	23.5	가 , , , ,
	20.8	,
	21.3	,
	100	



(5) 40

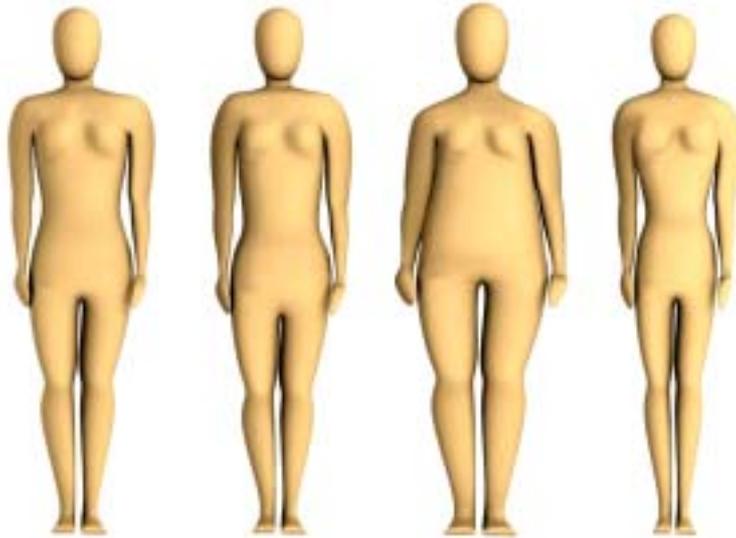
50

50 (14) 3가
6) . (

(14) 50

	(%)	a (50)
	35.9	,
	32.6	,
	31.5	가 ,
	100	

a) 가 ,



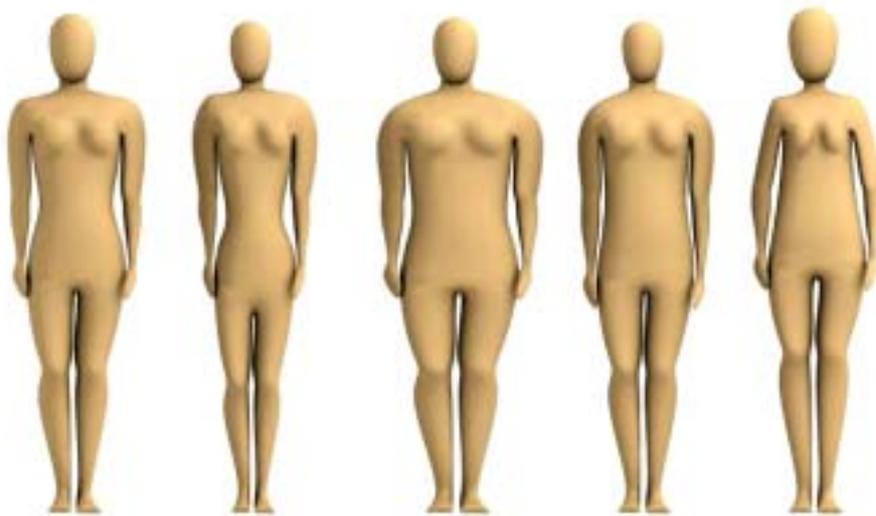
(6) 50

60

60 (15) 4가
,
7) .

() 60

	(%)	(60)
	23.5	가 , , ,
	29.0	, , .
	25.1	, , ,
	22.4	, , , ,
	100	



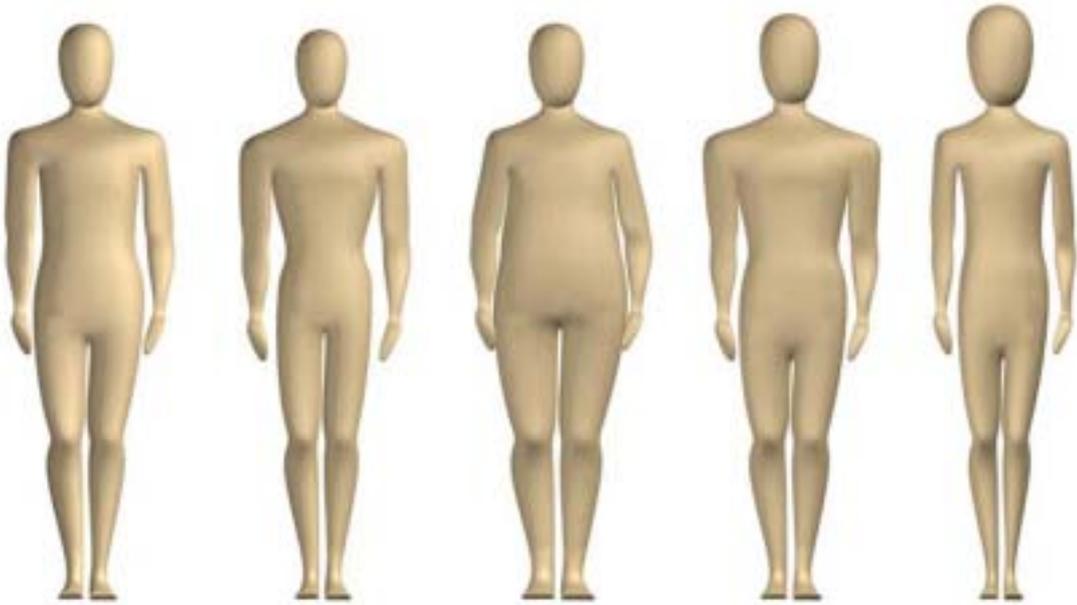
(7) 60

30

30 (17) 4가
,
9) .

(17) 30

	(%)	(30 a)
	26.2	가 , , , ,
	24.2	, , , ,
	24.8	, , , ,
	24.8	가 , , , ,
	100	



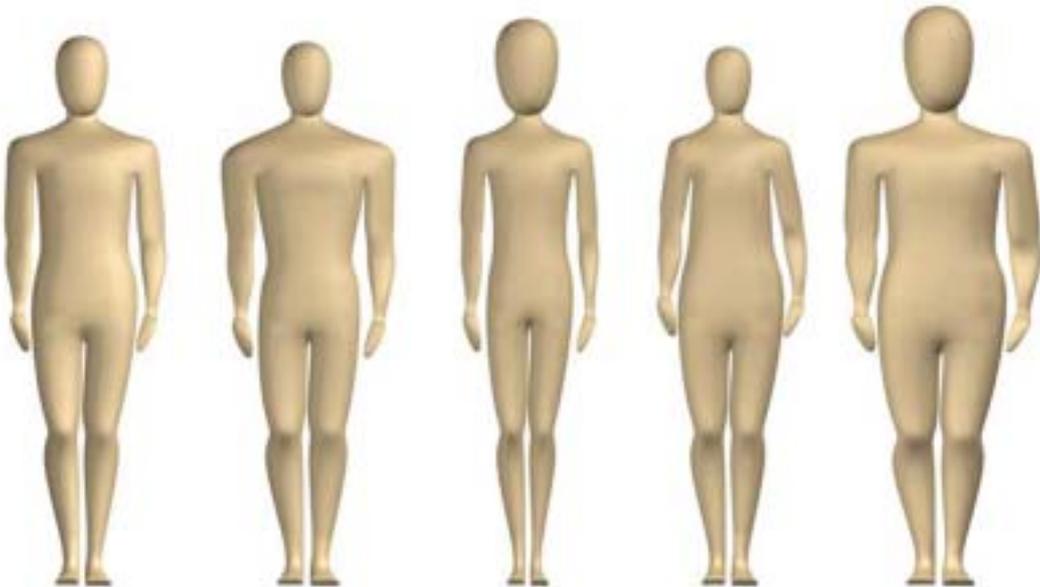
(9) 30

40

40 (18) 4가
10) . (

() 40

	(%)	(40 a)
	27.7	, , ,
	28.5	가 , , , , ,
	20.8	, , . ,
	23.0	, , . ,
	100	



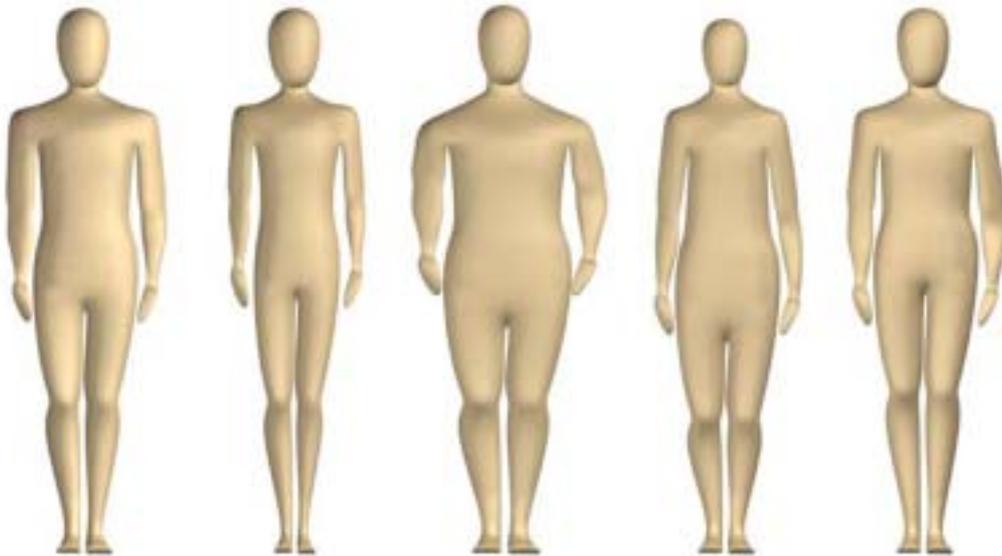
(10) 40

50

50 (19) 4가
11) .

(19) 50

	(%)	(50 a)
	27.4	가 , , , ,
	23.0	, , , ,
	18.2	, , , ,
	31.4	, , , ,
	100	



(11) 50

60

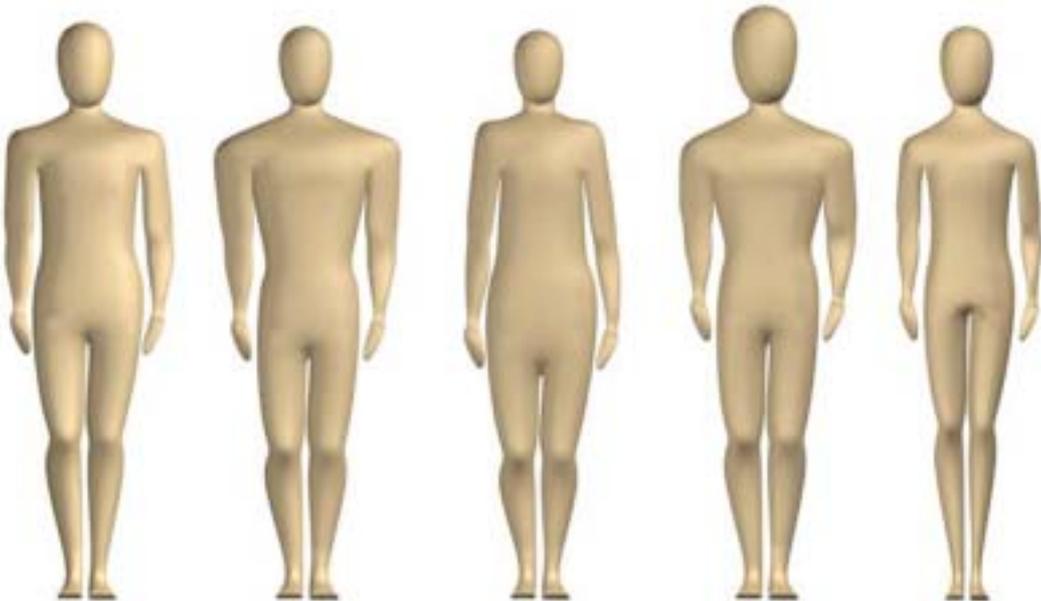
60 (20) 4가
12) .

(20) 60

	(%)	(60 a)
	31.5	,
	19.5	,
	25.9	,
	23.1	가 ,
	100	

a)

가 ,



(12) 60

□

size
, 20
가
20
(contingency table)
size
20
가
가
20
가

(21) 20

Pattern	Size			Total
	가			
	116	13	67	196
	8	99	9	116
	90	30	71	191
	66	19	82	167
Total	280	161	229	670

(22) 30

Pattern	Size			Total
		가	가	
()	11	126	59	196
	42	98	38	178
	95	1	32	128
()	18	55	134	207
Total	166	280	263	709

(23) 40

Pattern	Size			Total
	, 가	,	, 가	
	60	31	46	137
	28	29	38	95
	12	35	36	83
	28	25	33	86
Total	128	120	153	401

(24) 50

Pattern	Size			
		가	가	
	48	29	55	132
	60	44	16	120
	19	39	58	116
	127	112	129	368



(25) 60

Pattern	Size				Total
		가		가	
	16	22	25	24	87
	61	22	17	8	108
	15	40	24	16	95
	16	34	18	17	85
Total	108	118	84	65	375

(26) 20

Pattern	Size			Total
	가		가	
	83	52	70	205
	83	56	81	220
	92	53	91	236
Total	258	161	242	661

(27) 30

Pattern	Size				Total
	가	가			
	99	29	19	35	182
	40	13	56	59	168
	20	42	82	28	172
	43	78	43	10	174
Total	202	162	200	132	696

(28) 40

Pattern	Size			Total
		가		
	38	15	58	111
	19	77	16	112
	58	4	21	83
	35	23	32	90
Total	150	119	127	396

(29) 50

Pattern	Size				Total
	가			가	
	41	11	15	37	104
	9	42	30	6	87
	20	17	19	13	69
	37	34	30	18	119
Total	107	104	94	74	379

(30) 60

Pattern	Size				Total
	가		가		
	21	31	19	53	124
	14	12	21	27	74
	17	33	19	33	102
	39	22	12	18	91
Total	91	98	71	131	391

□

size
(multivariate analysis)

pattern

가

(contingency table)

가

가

(factor)

가

가

가

가

pattern

size

가

가

